INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS CL™ SERIES CAST IRON OIL-FIRED BOILER

As an ENERGY STAR® Partner, New Yorker Boiler Co., Inc. has determined that the CL3-091, CL3-105, CL4-126 and CL5-168 water boilers meet the ENERGY STAR® guidelines for Energy efficiency established by the United States Environmental Protection Agency (EPA).

For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

Boiler Model Number	Boiler Serial Number	Installation Date
CL		
Heating Contractor		Phone Number
Address		

New Yorker®
RESIDENTIAL HEATING BOILERS

100825-01R7-12/09

Price - $3.00

IMPORTANT INFORMATION - PLEASE READ THIS PAGE CAREFULLY

1. Read and understand all instructions, including all those contained in component manufacturers manuals which are provided with the appliance before installing, starting-up, operating, maintaining or servicing this appliance. Keep this manual and literature in legible condition and posted near appliance for reference by owner and service technician.
2. All heating systems should be designed by competent contractors and only persons knowledgeable in the layout and installation of hydronic heating systems should attempt installation of any boiler.
3. All boilers must be installed in accordance with National, State and Local Plumbing, Heating and Electrical Codes and the regulations of the serving utilities. These Codes and Regulations may differ from this instruction manual. Authorities having jurisdiction should be consulted before installations are made.

   In all cases, reference should be made to the following Standards:

USA BOILERS

A. Current Edition of American National Standard ANSI/NFPA 31, "Installation of Oil Burning Equipment", for recommended installation practices.

B. Current Edition of American National Standard ANSI/NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances", For Venting requirements.

C. Current Edition of American Society of Mechanical Engineers ASME CSD-1, "Controls and Safety Devices for Automatically Fired Boilers", for assembly and operations of controls and safety devices.

D. All wiring on boilers installed in the USA shall be made in accordance with the National Electrical Code and/or Local Regulations.

CANADIAN BOILERS

A. Current Edition of Canadian Standards Association CSA B139, "Installation Code for Oil Burning Equipment", for recommended Installation Practices.

B. All wiring on boilers installed in Canada shall be made in accordance with the Canadian Electrical Code and/or Local Regulations.

NOTICE

This boiler has a limited warranty, a copy of which is printed on the back of this manual.
The warranty for this boiler is valid only if the boiler has been installed, maintained and operated in accordance with these instructions.

DANGER

DO NOT store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

WARNING

This boiler is suitable for installation on combustible flooring. Do not install boiler on carpeting.

Installation is not complete unless a pressure relief valve is installed into the tapping located on top left corner of rear section - See Piping and Trim Sections of this manual for details.

This boiler is designed to burn No. 2 fuel oil only. Do not use gasoline, crankcase drainings, or any oil containing gasoline. Never burn garbage or paper in this boiler. Do not convert to any solid fuel (i.e. wood, coal). Do not convert to any gaseous fuel (i.e. natural gas, LP). All flammable debris, rags, paper, wood scraps, etc., should be kept clear of the boiler at all times. Keep the boiler area clean and free of fire hazards.

This boiler needs fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air.

This boiler must be connected to an approved chimney in good condition. Serious property damage could result if the boiler is connected to a dirty or inadequate chimney. The interior of the chimney flue must be inspected and cleaned before the start of the heating season for any obstructions. A clean and unobstructed chimney flue is necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.

Inspect flueways at least once a year - preferably at the start of the heating season. The inside of the combustion chamber, the vent system and boiler flueways should be cleaned if soot or scale has accumulated.
When cleaning this boiler, do not damage combustion chamber liner and/or rear target wall. If damaged, combustion chamber insulation must be replaced immediately.

This boiler requires regular maintenance and service to operate safely. Follow the instructions contained in this manual. Installation, maintenance, and service must be performed only by an experienced, skilled and knowledgeable installer or service agency.

It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is completed. Do not tamper with or alter the boiler or controls.

Do not operate unit if any control, switch, component, or device has been subject to water. When cleaning this boiler, do not damage combustion chamber liner and/or rear target wall. If damaged, combustion chamber insulation must be replaced immediately.

Oil Burner and Controls must be checked at least once a year or as may be necessitated.

All boilers equipped with burner swing door have a potential hazard which if ignored can cause severe property damage, personal injury or loss of life. Before opening swing door, turn off service switch to boiler to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely when service is completed.

Appliance materials of construction, products of combustion and the fuel contain alumina, silica, heavy metals, carbon monoxide, nitrogen oxides, aldehydes and/or other toxic or harmful substances which can cause death or serious injury and which are known to the state of California to cause cancer, birth defects and other reproductive harm. Always use proper safety clothing, respirators and equipment when servicing or working nearby the appliance.

High water temperatures increase the risk of scalding injury. If this boiler is equipped with a tankless heater for domestic water supply, a flow regulator and automatic mixing valve must be installed properly in tankless heater piping. See Piping and Trim Sections of the manual for details.

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I. General Information

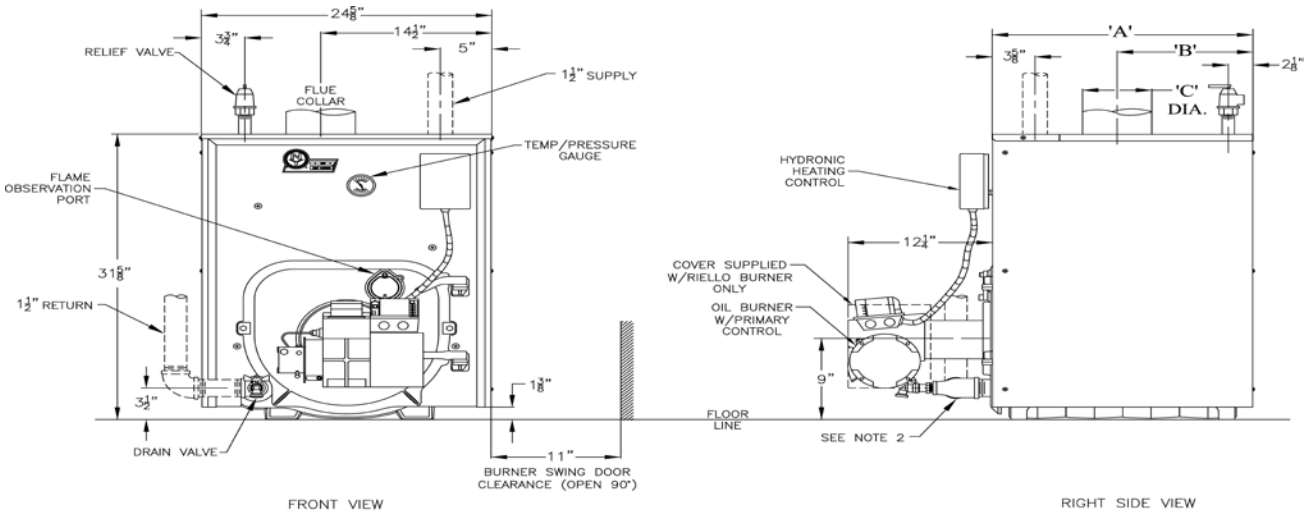
A. INSPECT SHIPMENT carefully for any signs of damage.

1. ALL EQUIPMENT is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of crated boiler to the carrier in good condition.
2. ANY CLAIMS for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within sixty (60) days after receipt of goods.

B. LOCATE BOILER in front of final position before removing crate. See Figures 1A thru 1D.

1. LOCATE so that smoke pipe connection to chimney will be short and direct. BOILER IS SUITABLE FOR INSTALLATION ON COMBUSTIBLE FLOOR. Boiler cannot be installed on carpeting.
2. FOR BASEMENT INSTALLATION, provide a solid base, such as a concrete pad, if floor is not level, or if water may be encountered on floor around boiler.
3. PROVIDE SERVICE CLEARANCE of at least 24” on top of boiler for cleaning flueways. Provide at least 24" on right side of boiler for removal of rear tankless heater. Provide at least 24” clearance from front jacket panel for servicing.
4. For minimum clearances to combustible materials. See Figure 2.

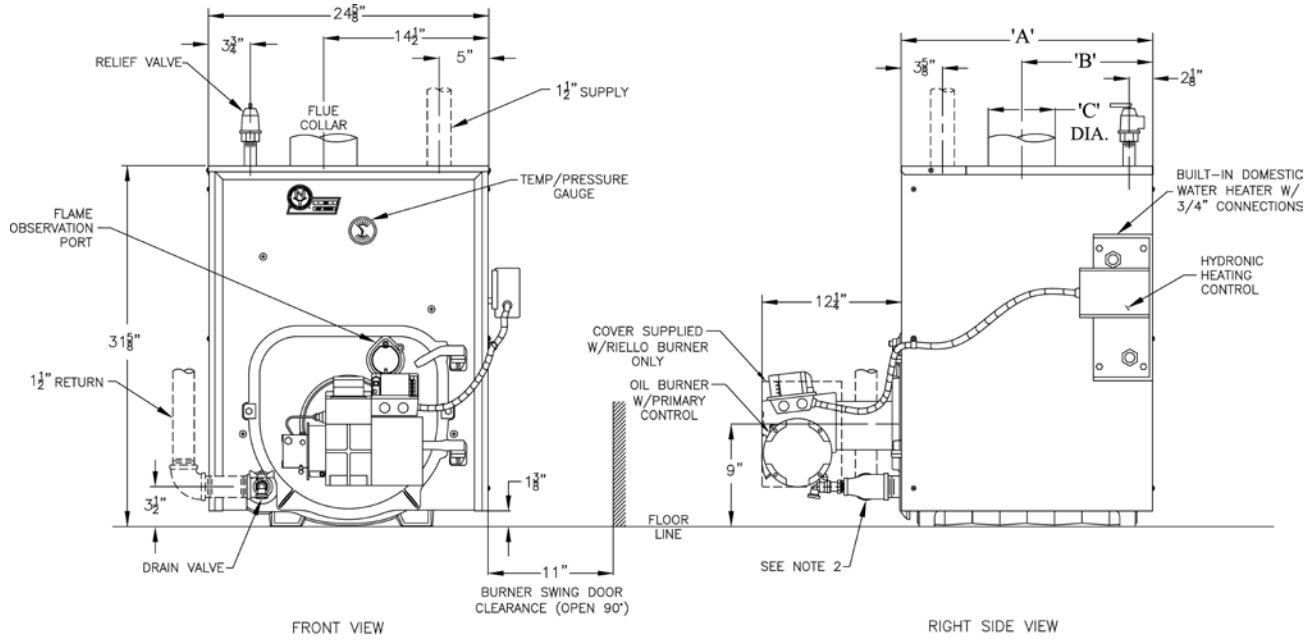
C. PROVIDE AIR SUPPLY AND VENTILATION to accommodate proper combustion. If natural ventilation is inadequate, provide a screened opening or duct from the boiler room to the outside. The opening or duct must be sized so the boiler input will not exceed 4,000 BTUH/Sq. In. of free area. If other air consuming appliances are near the boiler, the air inlet should be larger. Consult respective manufacturers.



NOTES:
1. CIRCULATOR SUPPLIED LOOSE – MAY BE INSTALLED ON SUPPLY OR RETURN.
2. RETURN FITTINGS AND DRAIN VALVE SHIPPED LOOSE.
3. PIPING SHOWN HIDDEN NOT FURNISHED WITH BOILER.

BOILER MODEL	DIMENSION		
	'A'	'B'	'C'
CL3	17 3/8"	8 1/4"	5 7/8"
CL4	22 3/8"	10 7/8"	6 7/8"
CL5	27 3/8"	13 3/8"	7 7/8"

Figure 1A: CL3 Thru CL5 Water Boiler Less Tankless Heater



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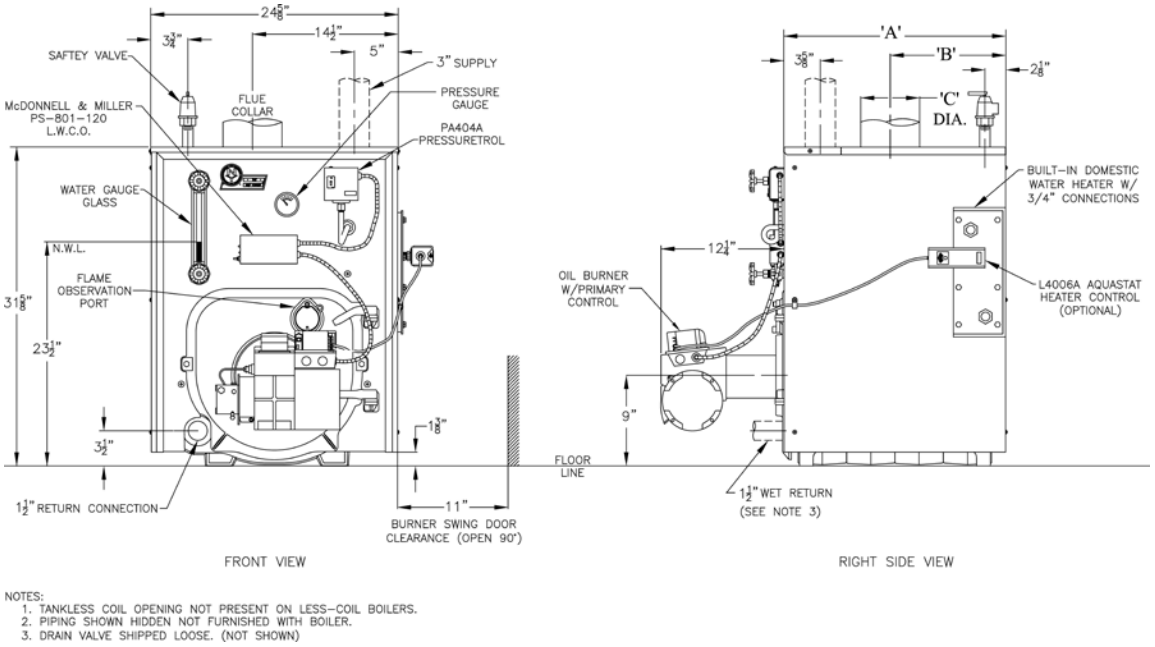
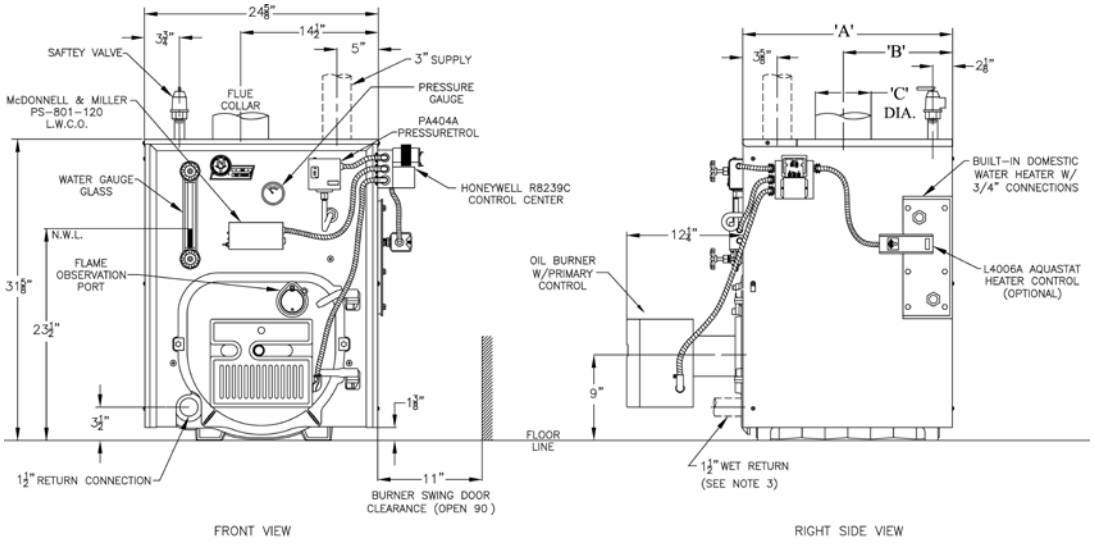
BOILER MODEL	DIMENSION		
	'A'	'B'	'C'
CL3	17 3/8"	8 1/4"	5 7/8"
CL4	22 3/8"	10 7/8"	6 7/8"
CL5	27 3/8"	13 3/8"	7 7/8"

Figure 1B: CL3 Thru CL5 Water Boiler With Tankless Heater



NOTES:
1. TANKLESS COIL OPENING NOT PRESENT ON LESS-COIL BOILERS.
2. PIPING SHOWN HIDDEN NOT FURNISHED WITH BOILER.
3. DRAIN VALVE SHIPPED LOOSE. (NOT SHOWN)

Figure 1C: CL3 Thru CL5 Steam Boiler with or without Tankless Heater



NOTES:
1. TANKLESS COIL OPENING NOT PRESENT ON LESS-COIL BOILERS.
2. PIPING SHOWN HIDDEN NOT FURNISHED WITH BOILER.
3. DRAIN VALVE SHIPPED LOOSE. (NOT SHOWN)

BOILER MODEL	DIMENSION		
	'A'	'B'	'C'
CL3	17⅜"	8¼"	5⅞"
CL4	22⅜"	10⅞"	6⅞"
CL5	27⅜"	13⅜"	7⅞"

Figure 1D: CL3 thru CL5 Steam Boiler with McDonnell & Miller PS-801 Low Water Cut-Off, Riello Burner

TABLE 1: DIMENSIONAL DATA (SEE FIGURES 1A THRU 1C)

Boiler Model	Dimensions			Minimum Chimney Size		Approx. Water Content - Gallons	Heat Transfer Surface Area - Sq. Ft.
	"A"	"B"	"C"	Rectangular	Round		
CL3	17-3/8"	8-1/4"	5-7/8"	8" x 8" x 15'	6" x 15'	16	14.33
CL4	22-3/8"	10-7/8"	6-7/8"	8" x 8" x 15'	7" x 15'	20	20.90
CL5	27-3/8"	13-3/8"	7-7/8"	8" x 8" x 15'	8" x 15'	24	27.46

Maximum Working Pressure: Steam: 15 PSI; Water: 30 PSI Shipped Standard from Factory, 50 PSI Optional

TABLE 2: RATING DATA

Boiler Model No. *	Burner Capacity		DOE Heating Capacity		I=B=R NET Ratings			Minimum Chimney Requirements			AFUE %	
	GPH	MBH	Water MBH	Steam MBH	Water MBH	Steam MBH	Steam Sq. Ft.	Round In. Dia.	Rectangle In. x In.	Height Ft.	Water	Steam
CL3-091(W)	0.65	91	80	---	70	---	---	6	8 x 8	15	86.0	---
CL3-091(S)	0.65	91	---	78	---	56	233	6	8 x 8	15	---	84.1
CL3-105(W)	0.75	105	91	---	79	---	---	6	8 x 8	15	85.1	---
CL3-105(S)	0.75	105	---	90	---	68	283	6	8 x 8	15	---	83.8
CL3-140(W)	1.00	140	120	---	104	---	---	6	8 x 8	15	83.6	---
CL3-140(S)	1.00	140	---	119	---	89	370	6	8 x 8	15	---	82.7
CL4-126(W)	0.90	126	111	---	97	---	---	7	8 x 8	15	85.8	---
CL4-126(S)	0.90	126	---	108	---	81	338	7	8 x 8	15	---	84.1
CL4-175(W)	1.25	175	152	---	132	---	---	7	8 x 8	15	84.2	---
CL4-175(S)	1.25	175	---	149	---	112	467	7	8 x 8	15	---	83.5
CL4-210(W)	1.50	210	179	---	156	---	---	7	8 x 8	15	83.1	---
CL4-210(S)	1.50	210	---	177	---	133	554	7	8 x 8	15	---	82.6
CL5-168(W)	1.20	168	147	---	128	---	---	8	8 x 8	15	85.7	---
CL5-168(S)	1.20	168	---	144	---	108	450	8	8 x 8	15	---	83.7
CL5-245(W)	1.75	245	210	---	183	---	---	8	8 x 8	15	83.0	---
CL5-245(S)	1.75	245	---	207	---	155	646	8	8 x 8	15	---	82.5
CL5-280(W)	2.00	280	238	---	207	---	---	8	8 x 8	15	82.5	---
CL5-280(S)	2.00	280	---	235	---	176	733	8	8 x 8	15	---	82.3

* Boiler Model Suffix: (W) = Water, (S) = Steam

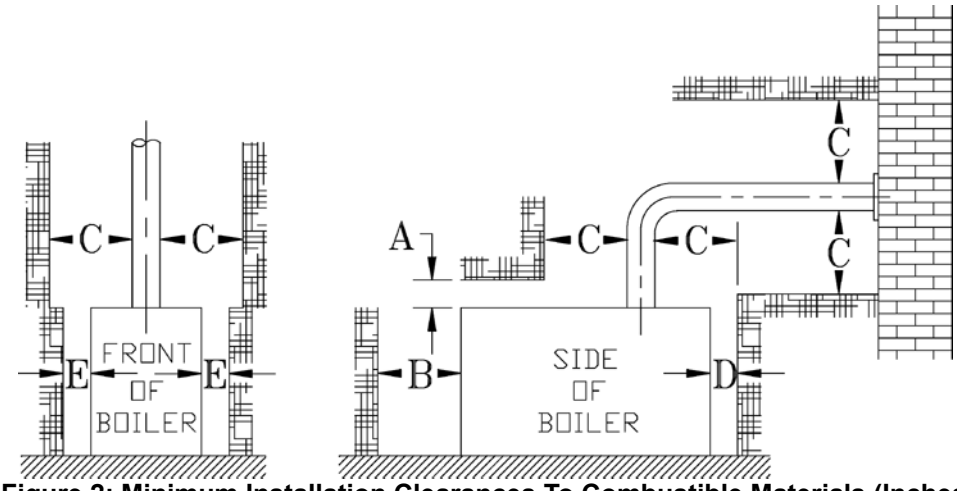


Figure 2: Minimum Installation Clearances To Combustible Materials (Inches)

A Above	B Front	C Chimney Connector	D Rear	E Sides
6	24	18	6	6

NOTE 1: Listed clearances comply with American National Standard NFPA 31, Standard for the Installation of Oil Burning Equipment.

NOTE 2: CL Series boilers can be installed in rooms with clearances from combustible material as listed above. Listed clearances cannot be reduced for alcove or closet installations.

NOTE 3: For reduced clearances to combustible material, protection must be provided as described in the ANSI/NFPA 31 standard.

II. Installation Instructions

A. REMOVE CRATE

1. Remove all fasteners at crate skid.
2. Lift outside container and remove all other inside protective spacers and bracing. Remove miscellaneous steam or water trim carton.
3. Using hand truck or pipe rollers under skid, move boiler into position along side installation site.

B. REMOVAL OF BOILER FROM SKID

1. Boiler is secured to base with 4 carriage bolts, 2 on left side and 2 on right side. See Figure 3. Remove all bolts.

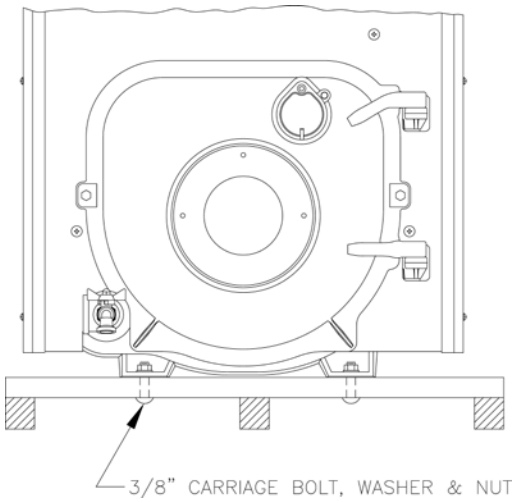


Figure 3: Removal of Boiler From Skid

2. Tilt boiler to right and to rear. Using right rear leg as pivot, rotate boiler 90° in a clockwise direction, and lower left side of boiler to floor. Tilt boiler and remove crate skid. Care should be exercised to prevent damage to jacket or burner.

C. MOVE BOILER TO PERMANENT POSITION by sliding or walking.

D. INSPECT COMBUSTION TARGET WALL AND COMBUSTION CHAMBER LINER

1. OPEN FLAME OBSERVATION DOOR AND/ OR BURNER SWING DOOR on front of boiler. Use flashlight to inspect target wall secured to rear section with silastic sealant. Inspect ceramic fiber blanket secured to floor of boiler with water glass adhesive. If either is damaged they must be replaced.

E. INSPECT NOZZLE, ELECTRODES INSERTION DEPTH AND TURBULATOR SETTING/CHANGE FIRING RATE: Refer also to *Model F3 & F5 Installation Manual, Riello 40 Series Residential Oil Burners* (C6501010) or *Model F10 Installation Manual, Riello 40 Series Residential Oil Burners* (2902554).

1. PACKAGED CL™ Series boilers are shipped with the highest input oil nozzle installed in the burner. Oil nozzles for lower firing rates are shipped loose for the CL3 through CL5 models, attached to the burner. Select the proper oil nozzle for the installation. The lower input nozzle will provide greater boiler efficiency. However, boiler output will be reduced. Refer to Table 2 for firing rates. **If the higher rate is desired**, inspect the installed nozzle and assure that the nozzle is the correct size and type as specified in Tables 9 and 9A of this manual.

   If a lower input is desired, remove the nozzle which was factory installed. Locate the lower firing rate nozzle that is supplied loose. Confirm the nozzle is the proper size and type for the lower firing rate as specified in Tables 9 and 9A of this manual. Install the proper nozzle in the burner nozzle adaptor.

2. On the Beckett AFG Burner, use the following procedure to complete the inspection, check the settings and to change the nozzle to a lower firing rate:
   a. Loosen two (2) igniter latching screws, rotate tabs and swing open igniter about hinge.
   b. Loosen knurled nut and disconnect copper connector tube.
   c. Remove nozzle line electrode assembly.
   d. **If high firing rate is desired**, confirm the nozzle is the proper size and type, refer to Table 9, then proceed to Item i. below.
   e. **If a lower input is desired**, remove the nozzle that was factory installed.
   f. Remove Beckett MD(V1) or MB(L1) head.
   g. Locate the desired nozzle. Refer to Table 9 for proper nozzle. The nozzle must be securely installed to assure leak free joints between the nozzle and adapter. When installing the nozzle, be careful not to bump or move the burner electrodes.

      NOTE: On the CL3-091 (0.65 GPH) burner application, a low firing rate baffle is required. Baffle is shipped loose with nozzles. Install baffle per Beckett Instruction included with baffle.
   h. Reinstall Beckett MD(V1) or MB(L1) Head.
   i. Inspect and measure burner electrodes. Refer to Figure 25 for the proper electrode setting. Readjust electrode setting to the proper dimensions if necessary. Refer to Figure 25.
   j. Reinstall nozzle line electrode assembly.
   k. Connect copper connector tube.

l. Inspect Beckett head setting on left side of burner by insuring the blue line MD(V1) or the line on the label MB(L1) are aligned, readjust if necessary.

m. Tighten knurled nut.

n. Swing igniter closed, rotate tabs and tighten two (2) igniter screws.

o. Replace burner cover and tighten burner cover knobs.

3. On the Carlin EZ-PH Burner, use the following procedure to complete the inspection, check the settings and to change the nozzle to a lower firing rate:

a. Loosen two (2) igniter latching screws, rotate tabs and swing open igniter about hinge.

b. Loosen knurled nut and disconnect copper connector tube.

c. Remove nozzle line electrode assembly from burner.

d. **If high firing rate is desired**, confirm the nozzle is the proper size and type, refer to Table 9, then proceed to Item i. below.

e. **If a lower input is desired**, remove the flame retention head and then remove the nozzle that was factory installed.

f. Locate the desired nozzle, refer to Table 9 for proper nozzle. The nozzle must be securely installed to assure leak free joints between the nozzle and adapter. When installing the nozzle, be careful not to bump or move the burner electrodes.

g. Reinstall Flame Retention Head on Nozzle Line Electrode Assembly. Make sure the clamp is fully sated against the shoulder on the nozzle adapter before securing.

h. Loosen and remove the retaining nut and factory installed head bar from side of burner housing. Install the proper head bar that corresponds to the desired firing rate, refer to Table 9, and tighten retaining nut.

i. Readjust air band to preliminary setting that corresponds to the lower firing rate nozzle installed, refer to Table 9.

j. Inspect and measure burner electrodes. Refer to Figure 25A for proper electrode setting. Readjust electrode setting to the proper dimensions if necessary.

k. Reinstall nozzle line electrode assembly.

l. Reconnect copper connector tube.

m. Tighten knurled nut.

n. Close igniter, rotate and tighten two (2) igniter latching screws.

4. On the Riello 40 Series Oil Burner, use the following procedure to complete the inspection, check the settings and to change the nozzle to a lower firing rate:

a. **Installation/Removal of Drawer Assembly**, refer to Figure 4.

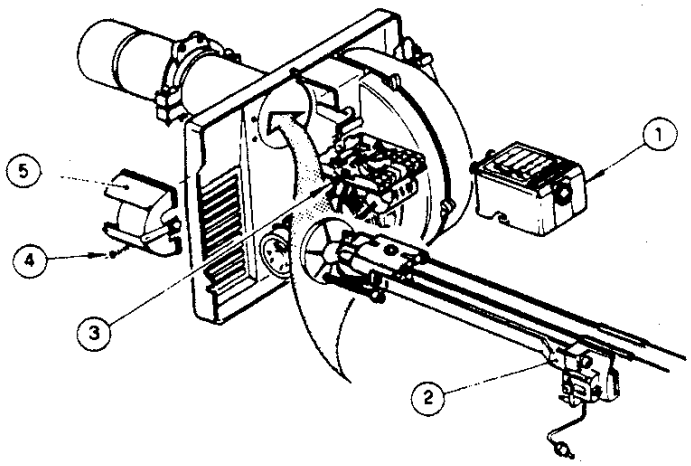


Figure 4: Installation/Removal of Drawer Assembly

i. Removal:

- Disconnect oil delivery tube nut from pump.
- Loosen SCREW (3), and then unplug PRIMARY CONTROL (1) by carefully pulling it back and then up.
- Remove the AIR TUBE COVER PLATE (5) by loosening the retaining SCREW (4) (Two SCREWS-Model F5).
- Loosen SCREW (2), and then slide the complete drawer assembly out of the combustion head as shown.

ii. Installation:

To insert drawer assembly, reverse the procedure in Step *i* above.

b. **Nozzle Replacement**, refer to Figure 5.

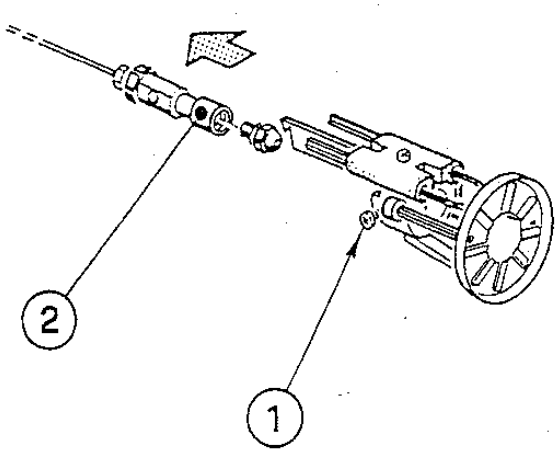


Figure 5: Nozzle Replacement

i. Remove the NOZZLE ADAPTER (2) from the DRAWER ASSEMBLY by loosening the SCREW (1).

ii. Remove existing nozzle from nozzle adapter.

iii. Insert the proper NOZZLE into NOZZLE ADAPTER and tighten securely (Do not cover tighten).

iv. Replace adapter, with nozzle installed, into drawer assembly and secure with screw (1).

c. **Inspect and measure burner electrodes**. Refer to Figure 6 for the proper electrode settings.

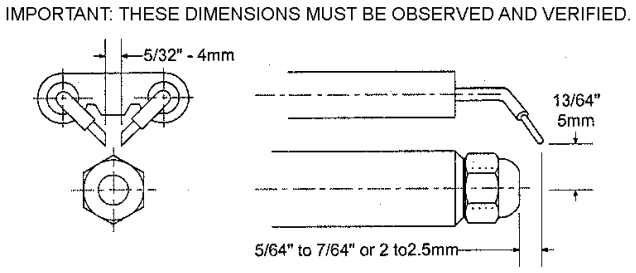


Figure 6: Electrode Setting

d. **Re-install Drawer Assembly into Combustion Head** per Step 4a above.

e. **Insertion Depth,** verify the distance between the tip of the end cone is equal to the distance specified in Table 9A.

f. **Turbulator Setting**, refer to Figure 7.

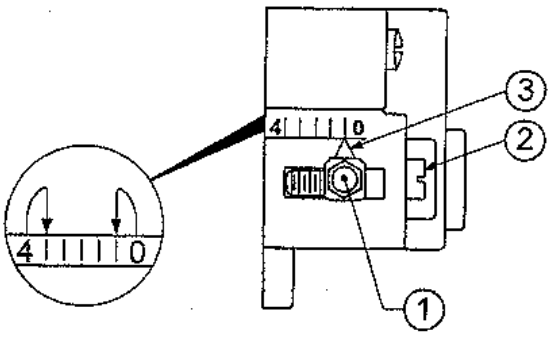


Figure 7: Turbulator Setting

g. **Pump Connections and Port Identification**, refer to Figure 8.

This burner is shipped with the oil pump set to operate on a **single** line system. To operate on a **two-line** system the bypass plug must be installed.

WARNING: **Do not** operate a **single** line system with the by-pass plug installed. Operating a **single** line system with the by-pass plug installed will result in damage to the pump shaft seal.

NOTE: Pump pressure was factory pre-set but must be checked at time of burner start-up. A pressure gauge is attached to the **PRESSURE/ BLEEDER PORT** (7) for pressure readings. Two **PIPE CONNECTORS** (4) are supplied with the burner for connection to either a single or two-line system. Also supplied are two **ADAPTORS** (3), two female ¼" NPT to adapt oil lines to burner pipe connectors. All pump port threads are **British Parallel Thread** design. Direct connection of NPT threads to the pump **will damage** the pump body.

Riello manometers and vacuum gauges **do not** require any adapters, and can be safely connected to the pump ports. An NPT x metric adapter **must** be used when connecting other gauge models.

h. **Replace Burner Cover** and Tighten Burner Cover Screws.

F. INSTALL WATER BOILER TRIM AND CONTROLS, (see Figures 1A and 1B)

1. Install return piping supplied with boiler. Apply Teflon or Sealant to all joints prior to assembly. Thread 1½" NPT x 5" Lg. return nipple into 1½" NPT tapping located in lower left corner of front section. Thread 1½" x ¾" x 1½" NPT tee onto 5" nipple. Thread ¾" drain valve into ¾" NPT connection on tee. Tighten all joints with wrench until water tight and 1½" NPT return connection on tee is facing away from boiler horizontally to allow for proper burner swing door clearance, see Figures 1A, 1B and Figure 9.

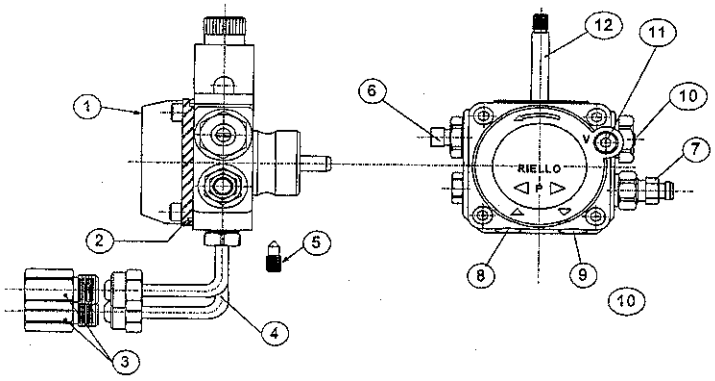

RIELLO
PUMP LEGEND
1. PUMP COVER
2. PUMP COVER O-RING
3. BSPP TO NPT ADAPTERS
4. SUPPLY AND RETURN OIL LINES
5. RETURN PORT BY PASS SCREW
6. NOZZLE PORT - PUMP OULET TO NOZZLE
7. PUMP PRESSURE PORT AND BLEEDER PORT
8. PUMP SUPPLY PORT
9. PUMP RETURN PORT
10. PUMP PRESSURE REGULATING SCREW
11. VACUUM PORT
12. PUMP VALVE STEM

Figure 8: Pump Connections and Port Identification

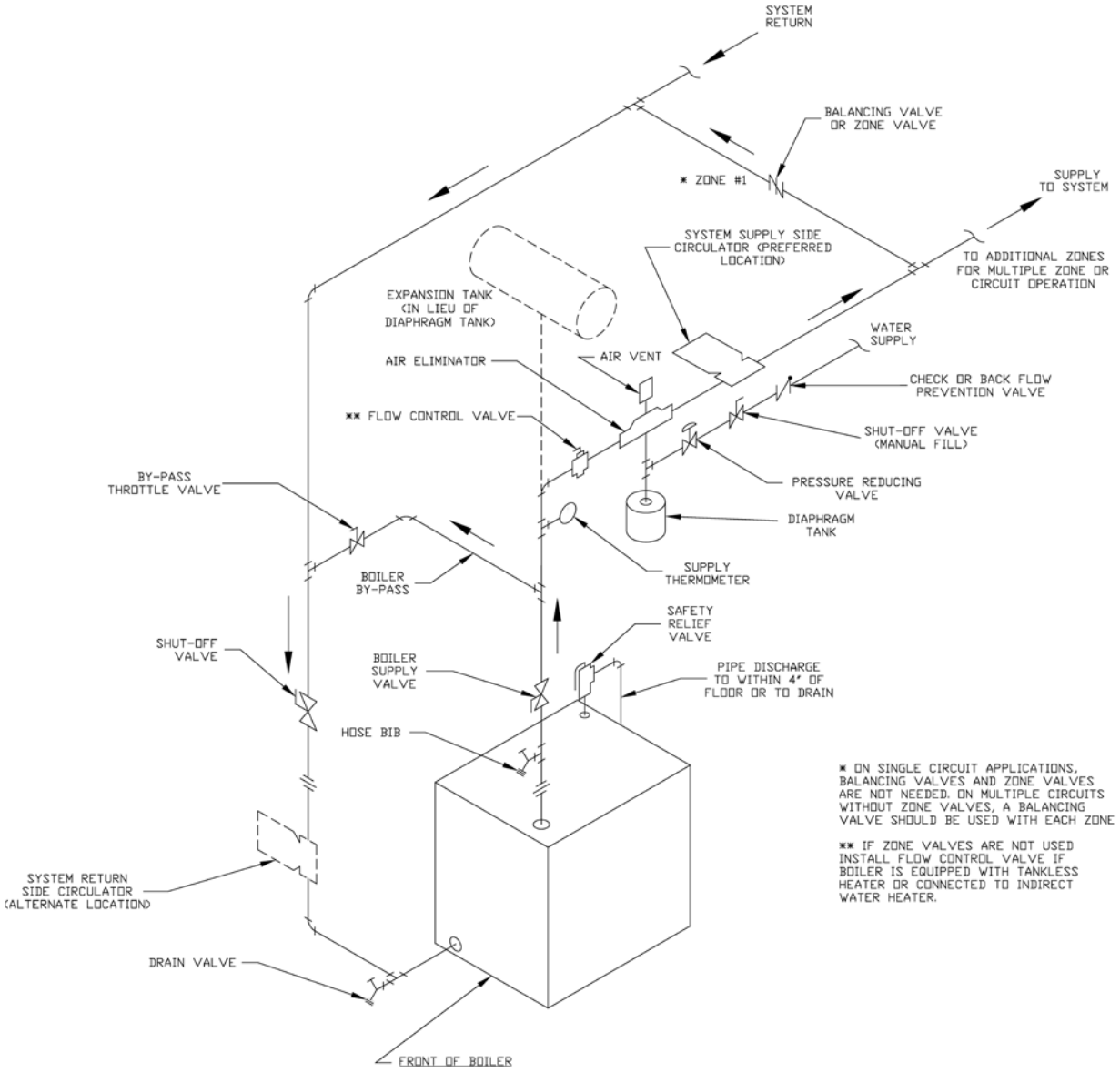

SYSTEM RETURN
BALANCING VALVE OR ZONE VALVE
* ZONE #1
SUPPLY TO SYSTEM
SYSTEM SUPPLY SIDE CIRCULATOR (PREFERRED LOCATION)
TO ADDITIONAL ZONES FOR MULTIPLE ZONE OR CIRCUIT OPERATION
EXPANSION TANK (IN LIEU OF DIAPHRAGM TANK)
WATER SUPPLY
AIR ELIMINATOR
AIR VENT
CHECK OR BACK FLOW PREVENTION VALVE
** FLOW CONTROL VALVE
SHUT-OFF VALVE (MANUAL FILL)
BY-PASS THROTTLE VALVE
PRESSURE REDUCING VALVE
DIAPHRAGM TANK
SUPPLY THERMOMETER
BOILER BY-PASS
SAFETY RELIEF VALVE
SHUT-OFF VALVE
BOILER SUPPLY VALVE
PIPE DISCHARGE TO WITHIN 4" OF FLOOR OR TO DRAIN
HOSE BIB
* ON SINGLE CIRCUIT APPLICATIONS, BALANCING VALVES AND ZONE VALVES ARE NOT NEEDED. ON MULTIPLE CIRCUITS WITHOUT ZONE VALVES, A BALANCING VALVE SHOULD BE USED WITH EACH ZONE
** IF ZONE VALVES ARE NOT USED INSTALL FLOW CONTROL VALVE IF BOILER IS EQUIPPED WITH TANKLESS HEATER OR CONNECTED TO INDIRECT WATER HEATER.
SYSTEM RETURN SIDE CIRCULATOR (ALTERNATE LOCATION)
DRAIN VALVE
FRONT OF BOILER

Figure 9: Recommended Boiler Piping for Series Loop Hot Water System

NOTE: Vertical piping will prevent door from opening fully for service and cleaning of boiler.

2. Thread relief valve onto factory installed ¾" NPT x 7¼" nipple located in left rear corner on top of boiler as shown in Figures 1A and 1B. Valve spindle must be in vertical position. Tighten with wrench. Pipe discharge as shown in Figure 9. Installation of the relief valve must be consistent with ANSI/ASME Boiler and Pressure Vessel Code, Section IV.
3. On boilers with rear tankless heater, factory wired L7224C Control Relay was not installed in heater. Locate ¾" NPT Immersion Well, apply sealant and thread into ¾" NPT tapping on heater. Apply heat transfer paste (not furnished) to control bulb and insert bulb into immersion well. Tighten clamp screws to secure control to immersion well. Secure control conduit to jacket right side panel with 5/8" cable clamp provided, refer to Figure 1B.
4. CONNECT FIELD WIRING
   a. Water boilers without tankless heater and with front tankless heater. Connect the field wiring from the circulator to the aquastat control and from the control to the burner. Make the wiring connections as shown on Figures 16B.
   b. Water boilers with rear tankless heater. Connect the field wiring from a standard junction box to the circulator, aquastat control and burner. Make the wiring connections as shown on Figure 17B.

G. INSTALL STEAM BOILER TRIM AND CONTROLS, (see Figures 1C and 1D).

1. Thread ¾" MPT safety valve and ¾" NPT coupling onto factory installed ¾" NPT x 7¼" nipple located in left rear corner on top of boiler as shown in Figure 1C. Tighten with wrench. Pipe discharge as shown in Figure 11. Installation of the relief valve must be consistent with ANSI/ASME Boiler and Pressure Vessel Code, Section IV.

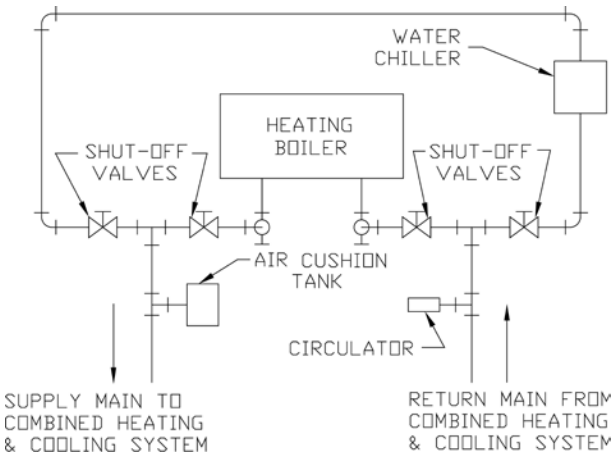


Figure 10: Recommended Piping for Combination Heating & Cooling (Refrigeration) Systems

2. Install ¾" drain valve in wet return piping as shown in Figure 11.
3. On boilers with rear tankless heater, factory wired L4006A Aquastat Heater Control was not installed in heater. Locate ¾" NPT Immersion Well, apply sealant and thread into ¾" NPT tapping on heater. Apply heat transfer paste (not furnished) to control bulb and insert bulb into immersion well. Tighten clamping screws to secure control to immersion well. Secure 18/2 Control Cable Wire to jacket right side panel with 5/16" cable clamp provided, refer to Figure 1C.
4. CONNECT FIELD WIRING
   a. Connect the field wiring to the pressure limit, the R8239C Control Center, the LWCO and the burner primary control. If equipped with tankless heater, connect field wiring from the aquastat control to the R8239C Control Center's "R-G" terminals. Make the wiring connections as shown in Figure 19B.

NOTICE

Before using copper for steam piping, consider the following characteristics of copper piping:

1) **High coefficient of thermal expansion can induce mechanical stresses and cause expansion/ contraction noises if not accounted for in the piping system design and installation,**
2) **High heat transfer rate (heat loss) of un-insulated copper piping must be included in the normal piping and pickup factors used to size the boiler,**
3) **Soldering or brazing pastes and fluxes that end up in the system can cause poor heat transfer, surging, an unsteady water line and wet steam if not thoroughly removed during boil out procedure and,**
4) **Galvanic corrosion of the adjoining metal may occur due to dissimilar metals in certain water chemistries if dielectric unions are not used.**

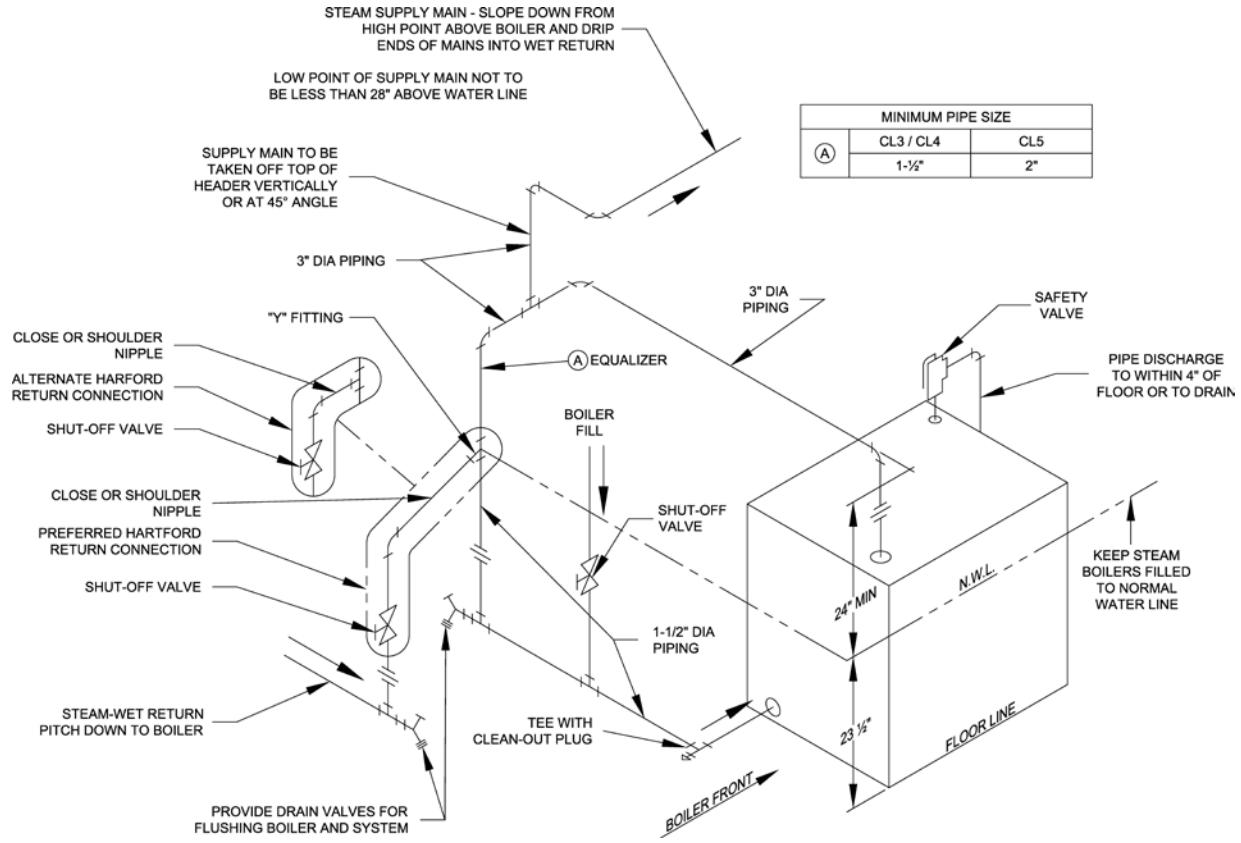

STEAM SUPPLY MAIN - SLOPE DOWN FROM HIGH POINT ABOVE BOILER AND DRIP ENDS OF MAINS INTO WET RETURN
LOW POINT OF SUPPLY MAIN NOT TO BE LESS THAN 28" ABOVE WATER LINE
MINIMUM PIPE SIZE
Ⓐ
CL3 / CL4
CL5
1-½"
2"
SUPPLY MAIN TO BE TAKEN OFF TOP OF HEADER VERTICALLY OR AT 45° ANGLE
3" DIA PIPING
"Y" FITTING
3" DIA PIPING
SAFETY VALVE
CLOSE OR SHOULDER NIPPLE
ALTERNATE HARFORD RETURN CONNECTION
Ⓐ EQUALIZER
PIPE DISCHARGE TO WITHIN 4" OF FLOOR OR TO DRAIN
SHUT-OFF VALVE
BOILER FILL
CLOSE OR SHOULDER NIPPLE
PREFERRED HARTFORD RETURN CONNECTION
SHUT-OFF VALVE
SHUT-OFF VALVE
SHUT-OFF VALVE
KEEP STEAM BOILERS FILLED TO NORMAL WATER LINE
24" MIN
N.W.L.
1-1/2" DIA PIPING
STEAM-WET RETURN PITCH DOWN TO BOILER
TEE WITH CLEAN-OUT PLUG
23 ½"
FLOOR LINE
BOILER FRONT
PROVIDE DRAIN VALVES FOR FLUSHING BOILER AND SYSTEM

Figure 11: Recommended Boiler Piping For Gravity Return Steam Boiler

H. CONNECT SUPPLY AND RETURN PIPING TO HEATING SYSTEM.

1. CLEARANCES — Steam and hot water pipes shall have clearances of at least ½" from all combustible construction.
2. WATER BOILER
   a. For Forced Circulation HOT WATER HEATING. See Figure 9. Consult I=B=R Installation and Piping Guide No. 200.
   b. Use a boiler water bypass if the boiler is to be operated in a system which has a large volume or excessive radiation where low boiler water temperature may be encountered (i.e. converted gravity circulation system, etc.).

      Install a pipe tee between the circulator and boiler return along with a second tee in the supply piping as shown in Figure 9. The bypass should be the same size as the supply and return lines. Locate valves in the bypass and supply outlet as illustrated in Figure 9 for regulation of water flow to maintain higher boiler water temperature.

      Set the by-pass and boiler supply valves to a half throttle position to start. Operate boiler until the system water temperature is a normal operating range.

      Adjust the valves to provide 180° to 200°F supply water temperature. Opening the boiler supply valves will raise the system temperature, while opening the bypass valve will lower the system supply temperature.
   c. If this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air the boiler piping must be equipped with flow control valves to prevent gravity circulation of boiler water during the operation of the cooling system.
   d. If this boiler is used in connection with refrigeration systems, the boiler must be installed so that the chilled medium is piped in parallel with the heating boiler using appropriate valves to prevent the chilled medium from entering the boiler, see Figure 10. Also consult I=B=R Installation and Piping Guides.
   e. A hot water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation. See Section VIII, Low Water Cut-Off for additional details.
3. STEAM BOILER
   a. For Recommended STEAM BOILER PIPING refer to Figure 11. Also, consult I=B=R Installation and Piping Guides.
   b. Evaluate the Existing Steam System.

      The single most important factor in determining the expected life cycle of a steam boiler, is the amount of fresh water added to the boiler during operation. Fresh water brings minerals and oxygen into the boiler. These contaminants greatly accelerate corrosion of the cast iron boiler sections.

      i. Assure that all system radiators, piping and vents are absolutely leak tight.
         - When a steam boiler is installed in an existing system, ALL air vents should be replaced at the same time. This assures that the new boiler will not be compromised by existing system leaks.
         - If the system contains hidden supply or return piping (hidden behind walls, buried in concrete, etc.) pressure test this piping to assure there are no leaks.

      ii. Repair any leaks in the system.

      iii. Install accurate water meter on the fresh water supply to the boiler.

NOTICE

Do not use softened water in steam boilers. Accelerated boiler corrosion will result. Tie in fresh water supply to the boiler upstream of a water softener.

4. OXYGEN CONTAMINATION:
   a. There are many possible causes of oxygen contamination such as:
      i. Addition of excessive make-up water as a result of system leaks.
      ii. Absorption through open tanks and fittings.
      iii. Oxygen permeable materials in the distribution system.
   b. In order to insure long product life, oxygen sources should be eliminated. This can be accomplished by taking the following measures:
      i. Repairing system leaks to eliminate the need for addition of make-up water.
      ii. Eliminating open tanks from the system.
      iii. Eliminating and/or repairing fittings which allow oxygen absorption.
      iv. Use of non-permeable materials in the distribution system.
      v. Isolating the boiler from the system water by installing a heat exchanger.

   See Section V, Paragraph B, Step 3 for additional details.

CAUTION

Oxygen contamination of the boiler water will cause corrosion of iron and steel boiler components, and can lead to boiler failure. New Yorker's Standard Warranty does not cover problems caused by oxygen contamination of boiler water or scale (lime) build-up caused by frequent addition of water.

I. CONNECT TANKLESS HEATER PIPING AS SHOWN IN Figure 12. See Table 3 for Tankless Heater Ratings.

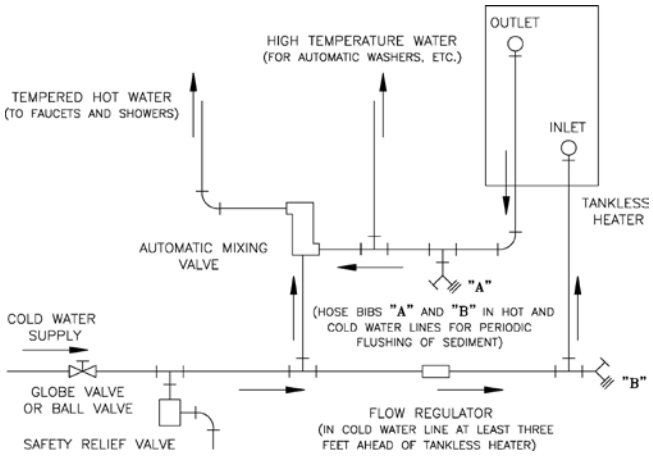


Figure 12: Schematic Tankless Heater Piping

TABLE 3: TANKLESS HEATER DATA

Boiler Model	Rating (Gal/Min)		Pressure Drop (PSI)	
	Steam	Water	Steam	Water
CL3-091	2.25	2.75	2.3	3.9
CL3-105	2.25	3.00	2.3	4.7
CL3-140	2.50	3.25	3.1	5.6
CL4-126	2.50	3.25	3.1	5.6
CL4-175	2.75	3.75	3.9	7.2
CL4-210	3.00	4.00	4.7	8.0
CL5-168	2.75	3.50	3.9	6.4
CL5-245	3.25	4.25	5.6	8.8
CL5-280	3.50	4.75	6.4	9.6

THE FOLLOWING GUIDELINES SHOULD BE FOLLOWED WHEN PIPING THE TANKLESS HEATER:

1. FLOW REGULATION — If flow through the heater is greater than its rating, the supply of adequate hot water may not be able to keep up with the demand. For this reason a flow regulator matching the heater rating should be installed in the cold water line to the heater. The flow regulator should preferably be located below the inlet to the heater and a minimum of 3' away from the inlet so that the regulator is not subjected to excess temperatures that may occur during "off" periods when it is possible for heat to be conducted back through the supply line. The flow regulator also limits the flow of supply water regardless of inlet pressure variations in the range of 20 to 125 psi.
2. TEMPERING OF HOT WATER — Installation of an automatic mixing valve will lengthen the delivery of the available hot water by mixing some cold water with the hot. This prevents excessive and possibly scalding hot water at the fixtures. In addition, savings of hot water will be achieved since the user will not waste as much hot water while seeking water temperature to his liking. Higher temperature hot water required by dishwashers and automatic washers is possible by piping the hot water from the heater prior to entering the mixing valve. The mixing valve should be "trapped" by installing it below the cold water inlet to heater to prevent lime formation in the valve.

WARNING

Install automatic mixing valve at tankless heater outlet to avoid risk of burns or scalding due to excessively hot water at fixtures. Adjust and maintain the mixing valve in accordance with the manufacturer's instructions.

3. FLUSHING OF HEATER — All water contains some sediment which settles on the inside of the coil. Consequently, the heater should be periodically backwashed. This is accomplished by installing hose bibs as illustrated and allowing water at city pressure to run into hose bib A, through the heater, and out hose bib B until the discharge is clear. The tees in which the hose bibs are located should be the same size as heater connections to minimize pressure drop.
4. HARD WATER — A water analysis is necessary to determine the hardness of your potable water. This is applicable to some city water and particularly to well water. An appropriate water softener should be installed based on the analysis and dealer's recommendation. This is not only beneficial to the tankless heater but to piping and fixtures plus the many other benefits derived from soft water.

J. INSTALL SMOKEPIPE — The CL Series boiler should be vented into a fireclay tile-lined masonry chimney or chimney constructed from type L vent or a factory built chimney that complies with the type HT requirements of UL103. The chimney and vent pipe shall have a sufficient draft at all times, to assure safe proper operation of the boiler. See Figure 13 for recommended installation.

1. Install a draft regulator (supplied by installer) following the instructions furnished with the regulator. See Figure 14 for draft regulator locations.
2. Consider the chimney overall. Chimneys that have a high heat loss may become less suitable as the heat loss of the home goes down and the efficiency of the boiler installed goes up. Most homes have a chimney appropriate for the fuel and the era in which the home was built. That may have been a coal fired or an inefficient oil fired boiler built into a home without insulation or storm windows. With increasing fuel prices that home probably has been insulated and fitted with storm windows so that

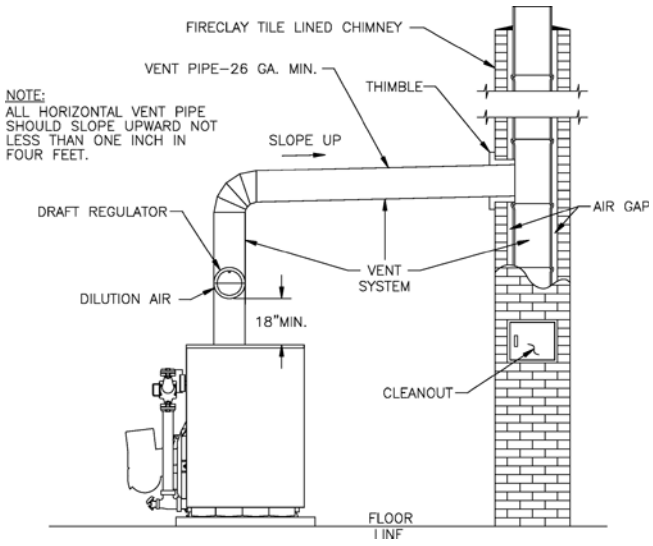


Figure 13 Recommended Smokepipe Arrangement and Chimney Requirements

the heat loss of the home has been reduced. This requires less fuel to be burned and sends less heat up the chimney.

A new boiler probably has a higher efficiency than the boiler being replaced. That probably means that the stack temperature from the new boiler will be lower than that from the old boiler and with less room air being drawn up the chimney to dilute the stack gases. The combination of a large uninsulated chimney, reduced firing rate, reduced firing time, lower stack temperature and less dilution air can, in some cases, contribute to the condensing of small amounts of water vapor in the chimney. Such condensation, when it occurs, can cause chimney deterioration. In extreme cases, condensed water may be visible on the outside of the breeching or chimney. In those extreme cases, the chimney may have to be lined to insulate the chimney and thus prevent the condensation. The addition of dilution air into the chimney may assist in drying the chimney interior surfaces.

A massive chimney on a cold, or exposed outside wall may have produced adequate draft when it was fired with a higher input and greater volumes of heated gases. With reduced input and volume, the draft may be severely affected. In one instance research showed a new chimney of adequate sizing produced only .035" W.C. after 30 minutes of continuous firing at 13.0% CO_2. Outside wall chimneys take longer to heat up and can have .00" W.C. draft at burner startup. You may have to consider a special alloy chimney flue liner with insulation around it and a stabilizing draft cap or even a draft inducing fan in severe cases.

3. For the same reasons as in 2. above, heat extractors mounted into the breeching are not recommended.

IMPORTANT

Single-pipe installations must be absolutely airtight or leaks or loss of prime may result. Bleed line and fuel unit completely.

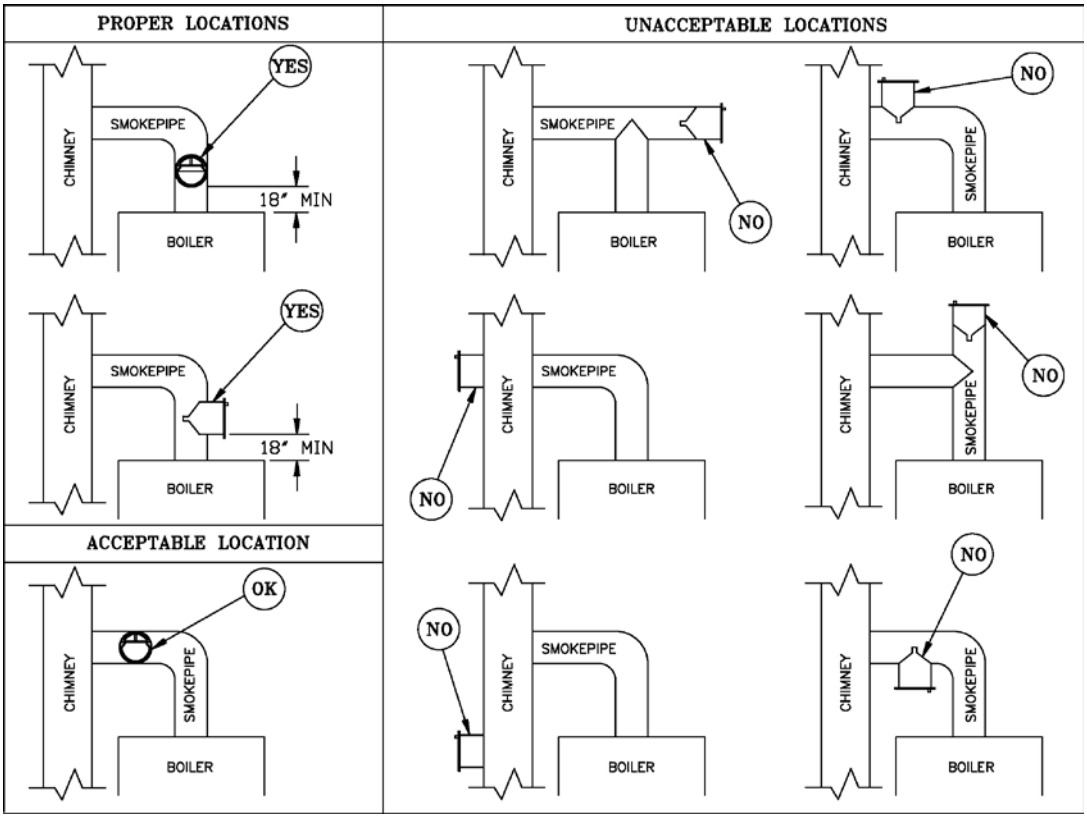


Figure 14: Proper and Improper Locations of Draft Regulator

K. FUEL UNITS AND OIL LINES

SINGLE-PIPE OIL LINES Standard burners are provided with single-stage 3450 rpm fuel units with the by-pass plug removed for single-pipe installations.

The single-stage fuel unit may be installed single-pipe with gravity feed or lift. Maximum allowable lift is 8 feet. See Figure 15.

TWO-PIPE OIL LINES For two-pipe systems where more lift is required, the two-stage fuel unit is recommended. Table 4 (single-stage) and Table 5 (two-stage) show allowable lift and lengths of 3/8-inch and 1/2-inch OD tubing for both suction and return lines. Refer to Figure 16.

Be sure that all oil line connections are absolutely airtight. Check all connections and joints. Flared fittings are recommended. Do not use compression fittings.

Open the air-bleed valve and start the burner. For clean bleed, slip a 3/16" ID hose over the end of the bleed valve and bleed into a container. Continue to bleed for 15 seconds after oil is free of air bubbles. Stop burner and close valve.

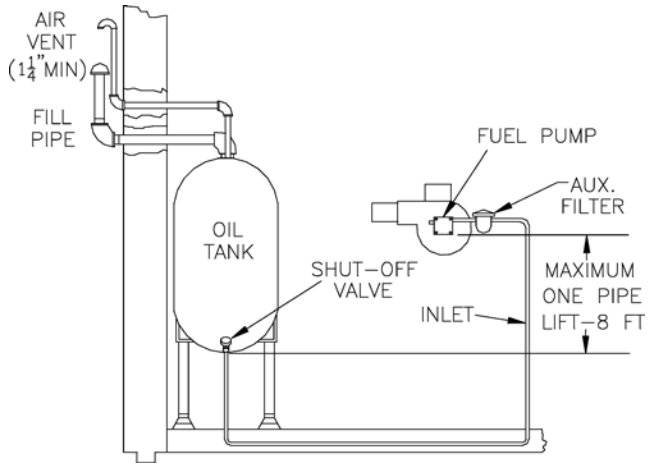


Figure 15

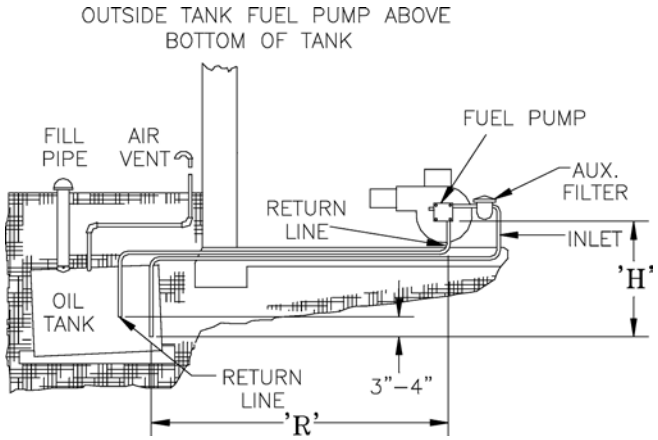


Figure 16

TABLE 4: SINGLE STAGE UNITS (3450 RPM) TWO PIPE SYSTEMS

Lift "H" (See Figure)	Maximum Length of Tubing "H" + "R" (See Figure)	
	3/8" OD Tubing (3 GPH)	1/2" OD Tubing (3 GPH)
0'	84'	100'
1'	78'	100'
2'	73'	100'
3'	68'	100'
4'	63'	100'
5'	57'	100'
6'	52'	100'
7'	47'	100'
8'	42'	100'
9'	36'	100'
10'	31'	100'
11'	26'	100'
12'	21'	83'
13'	---	62'
14'	---	41'

TABLE 5: TWO-STAGE UNITS (3450 RPM) TWO-PIPE SYSTEMS

Lift "H" (See Figure)	Maximum Length of Tubing "H" + "R" (See Figure)	
	3/8" OD Tubing (3 GPH)	1/2" OD Tubing (3 GPH)
0'	93'	100'
2'	85'	100'
4'	77'	100'
6'	69'	100'
8'	60'	100'
10'	52'	100'
12'	44'	100'
14'	36'	100'
16'	27'	100'
18'	---	76'

L. INSTALL ELECTRIC WIRING in accordance with National Electrical Code and local regulations. A separate electrical circuit must be run from the main electrical service with an over-current device/disconnect in the circuit. A service switch is recommended and may be required by some local jurisdictions. Wiring should conform to Figures 17 thru 19B.

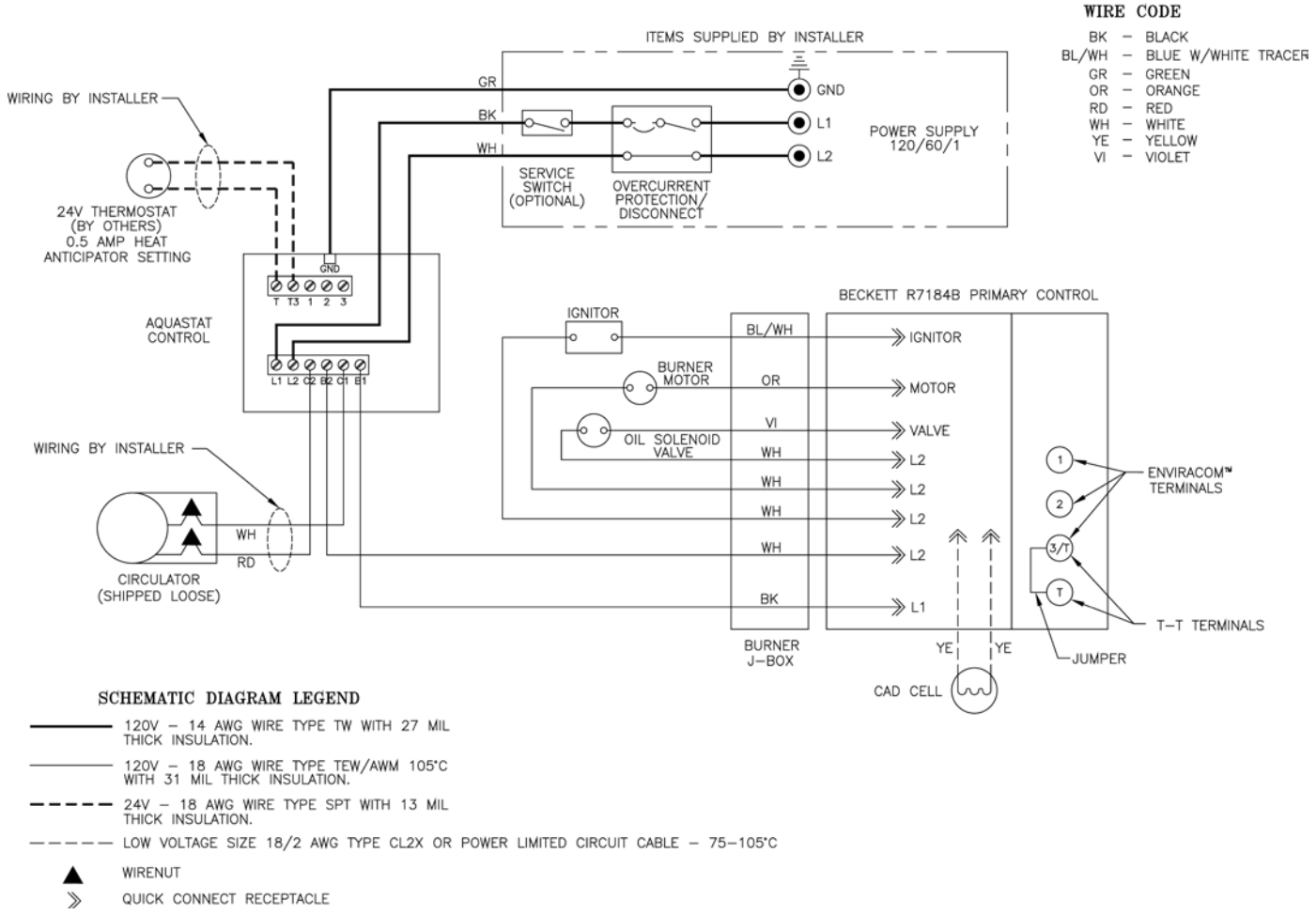


Figure 17: Wiring Diagram for Water Boilers With Beckett AFG Burner and Split Controls Less Tankless Heater

SEQUENCE OF OPERATION

A call for heat by the thermostat energizes the L7248C control which in turn energizes the primary control. The burner will initiate ignition after completing a 15 second pre-purge cycle. If burner ignites within approximately 45 seconds and the cad cell sees flame, the burner will continue to operate until the call for heat is satisfied or the setting of the high limit is reached. The circulator will operate as long as the thermostat is calling for heat. If the thermostat is not satisfied and the high limit is reached, the circulator will continue to operate, and the burner will stop until the high limit is closed by a drop in boiler water temperature.

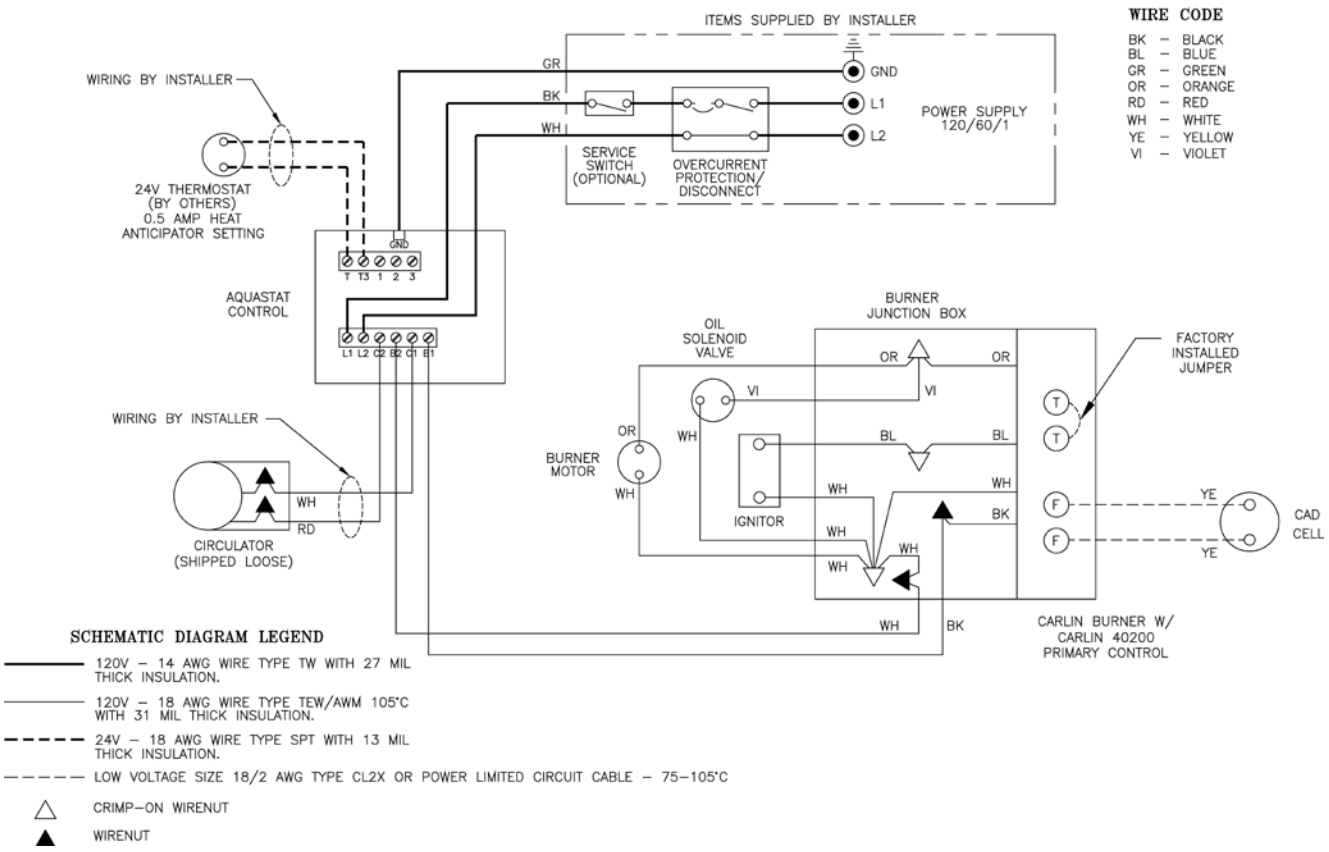


Figure 17A: Wiring Diagram for Water Boilers With Carlin EZ-HP Burner and Split Controls Less Tankless Heater

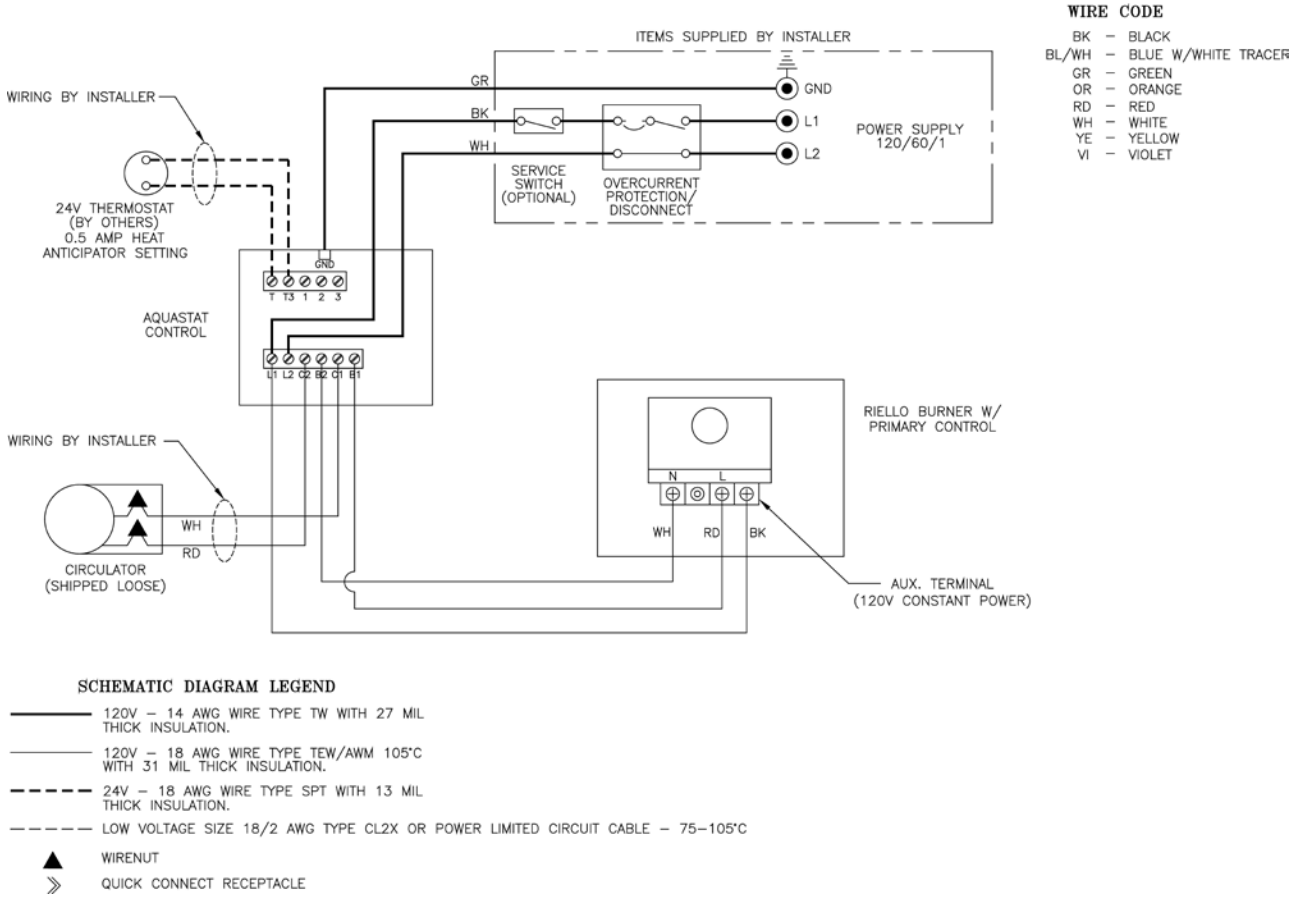


Figure 17B: Wiring Diagram, Water without Tankless Heater, Riello Burner

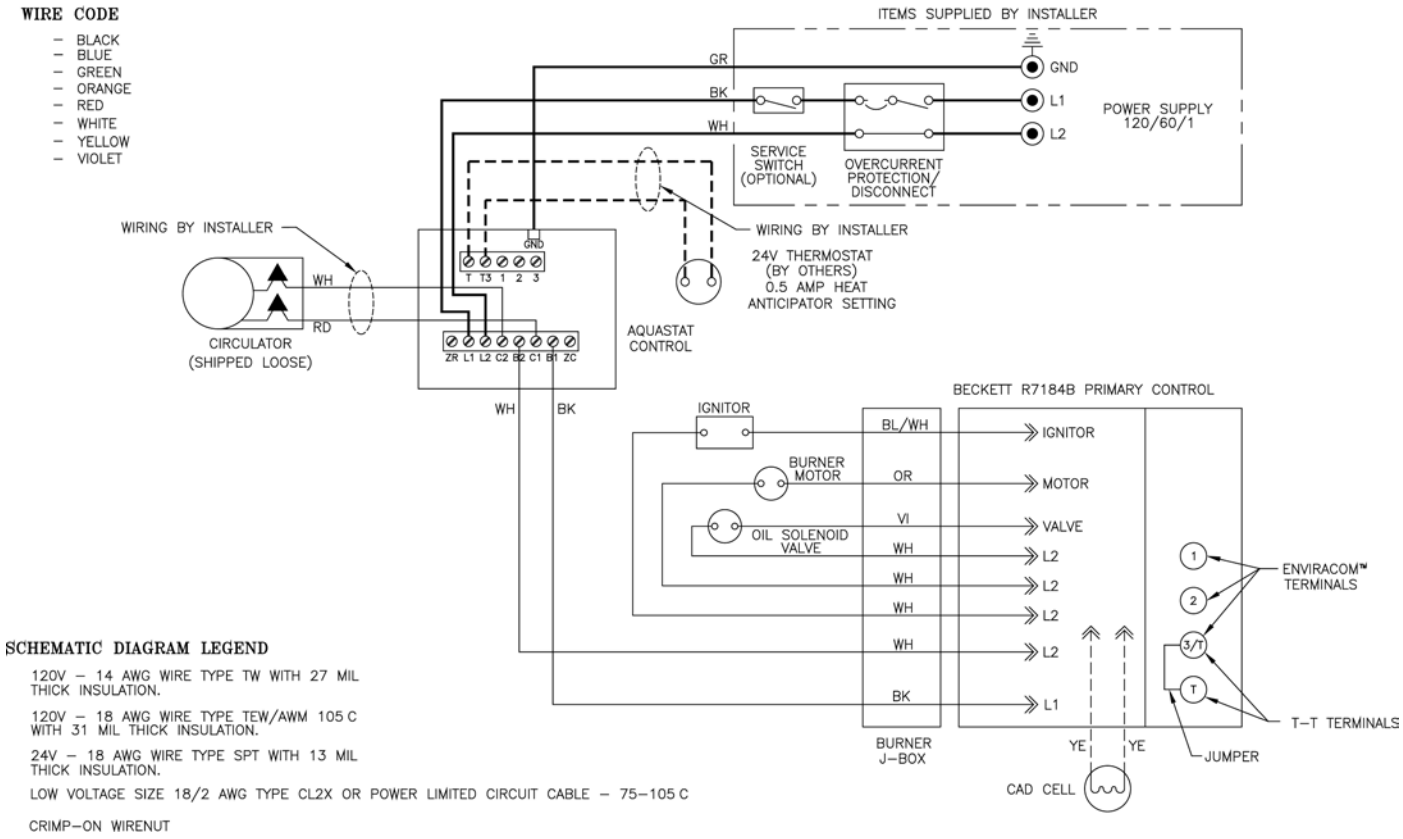


Figure 18: Wiring Diagram for Water Boilers with Beckett AFG Burner and Split Controls with Tankless Heater

SEQUENCE OF OPERATION

A call for heat by the thermostat energizes the L7224C control which in turn energizes the primary control. The burner will initiate ignition after completing a 15 second pre-purge cycle. If burner ignites within approximately 45 seconds and the cad cell sees flame the burner will continue to operate until the call for heat is satisfied. The circulator will also operate when the thermostat calls for heat if the boiler water temperature is up to the setting of the low limit in the L7224C control. If boiler water temperature is below the low limit setting the burner will operate but the circulator will not, giving preference to the domestic hot water demand.

On call for heat by the thermostat the burner will continue to operate until the thermostat is satisfied or the setting of the high limit is reached. If the thermostat is not satisfied when the high limit is reached the burner will stop but the circulator will continue to operate until the thermostat is satisfied.

Any time the boiler water temperature drops below the setting of the low limit the burner will be energized in order to maintain domestic water temperature.

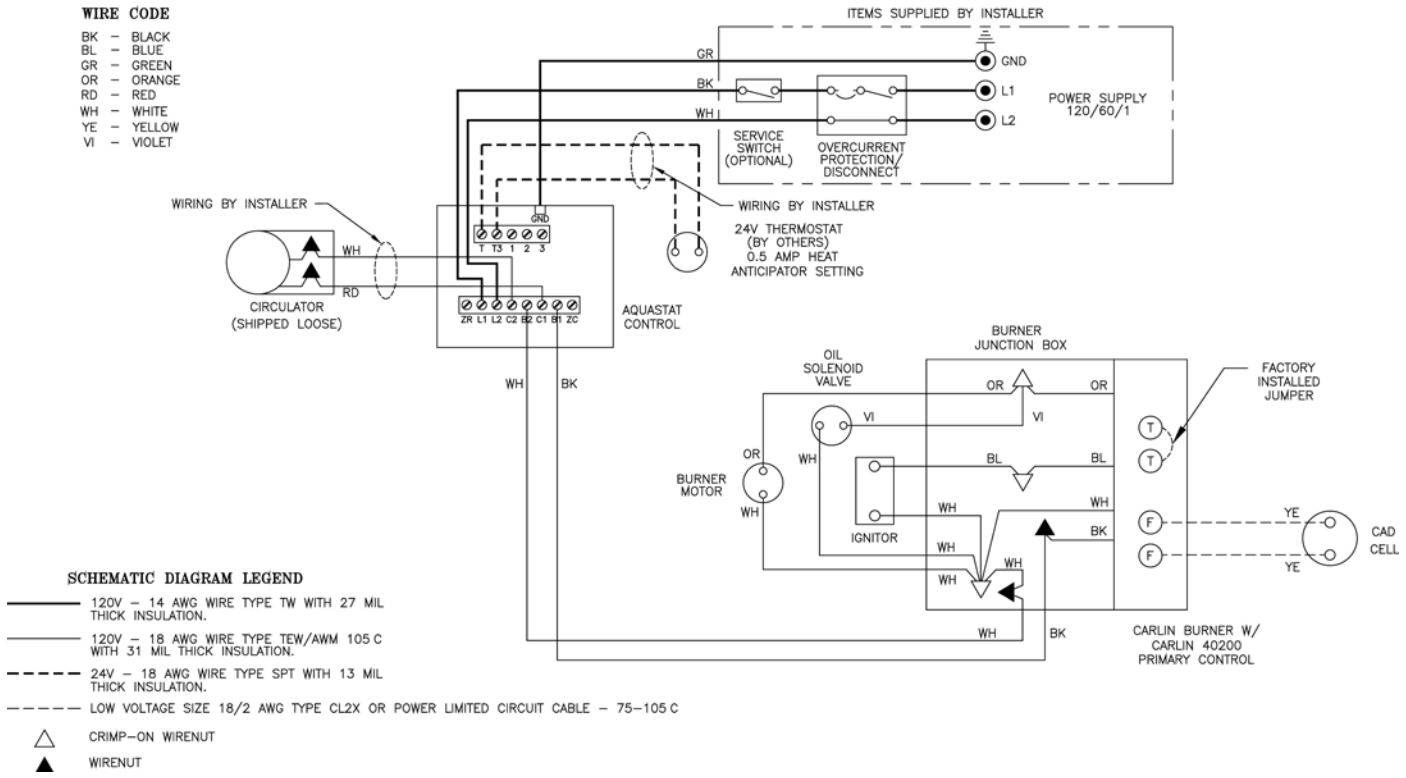

WIRE CODE
BK – BLACK
BL – BLUE
GR – GREEN
OR – ORANGE
RD – RED
WH – WHITE
YE – YELLOW
VI – VIOLET
ITEMS SUPPLIED BY INSTALLER
GND
L1
L2
POWER SUPPLY 120/60/1
SERVICE SWITCH (OPTIONAL)
OVERCURRENT PROTECTION/ DISCONNECT
WIRING BY INSTALLER
24V THERMOSTAT (BY OTHERS) 0.5 AMP HEAT ANTICIPATOR SETTING
CIRCULATOR (SHIPPED LOOSE)
AQUASTAT CONTROL
BURNER JUNCTION BOX
OIL SOLENOID VALVE
FACTORY INSTALLED JUMPER
BURNER MOTOR
IGNITOR
CAD CELL
CARLIN BURNER W/ CARLIN 40200 PRIMARY CONTROL
SCHEMATIC DIAGRAM LEGEND
120V – 14 AWG WIRE TYPE TW WITH 27 MIL THICK INSULATION.
120V – 18 AWG WIRE TYPE TEW/AWM 105 C WITH 31 MIL THICK INSULATION.
24V – 18 AWG WIRE TYPE SPT WITH 13 MIL THICK INSULATION.
LOW VOLTAGE SIZE 18/2 AWG TYPE CL2X OR POWER LIMITED CIRCUIT CABLE – 75–105 C
CRIMP–ON WIRENUT
WIRENUT

Figure 18A: Wiring Diagram for Water Boilers with Carlin EZ-PH Burner and Split Controls with Tankless Heater

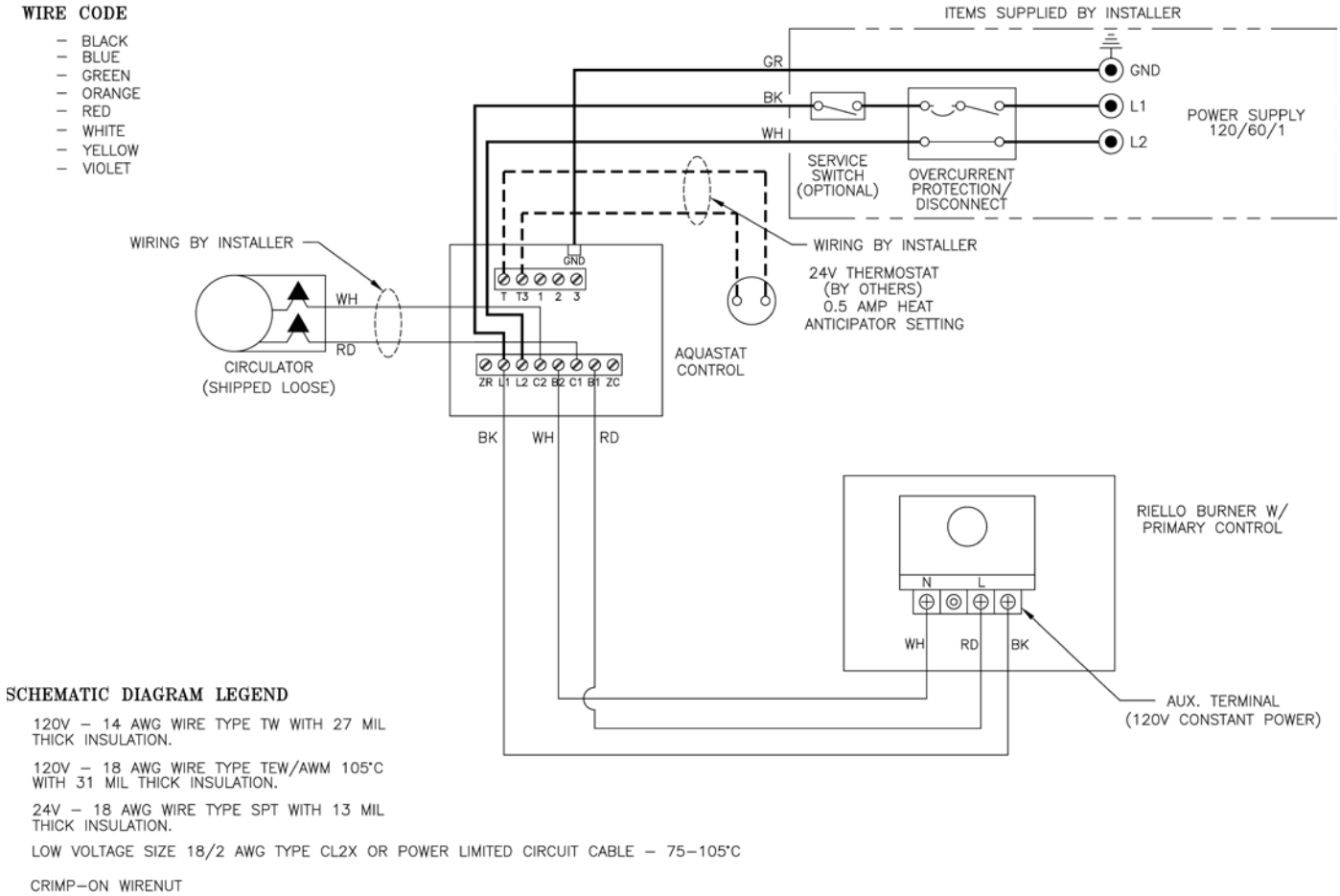

WIRE CODE
– BLACK
– BLUE
– GREEN
– ORANGE
– RED
– WHITE
– YELLOW
– VIOLET
ITEMS SUPPLIED BY INSTALLER
GND
L1
L2
POWER SUPPLY 120/60/1
SERVICE SWITCH (OPTIONAL)
OVERCURRENT PROTECTION/ DISCONNECT
WIRING BY INSTALLER
24V THERMOSTAT (BY OTHERS) 0.5 AMP HEAT ANTICIPATOR SETTING
CIRCULATOR (SHIPPED LOOSE)
AQUASTAT CONTROL
RIELLO BURNER W/ PRIMARY CONTROL
AUX. TERMINAL (120V CONSTANT POWER)
SCHEMATIC DIAGRAM LEGEND
120V – 14 AWG WIRE TYPE TW WITH 27 MIL THICK INSULATION.
120V – 18 AWG WIRE TYPE TEW/AWM 105°C WITH 31 MIL THICK INSULATION.
24V – 18 AWG WIRE TYPE SPT WITH 13 MIL THICK INSULATION.
LOW VOLTAGE SIZE 18/2 AWG TYPE CL2X OR POWER LIMITED CIRCUIT CABLE – 75–105°C
CRIMP–ON WIRENUT

Figure 18B: Wiring Diagram, Water with Rear Tankless Heater, Riello Burner

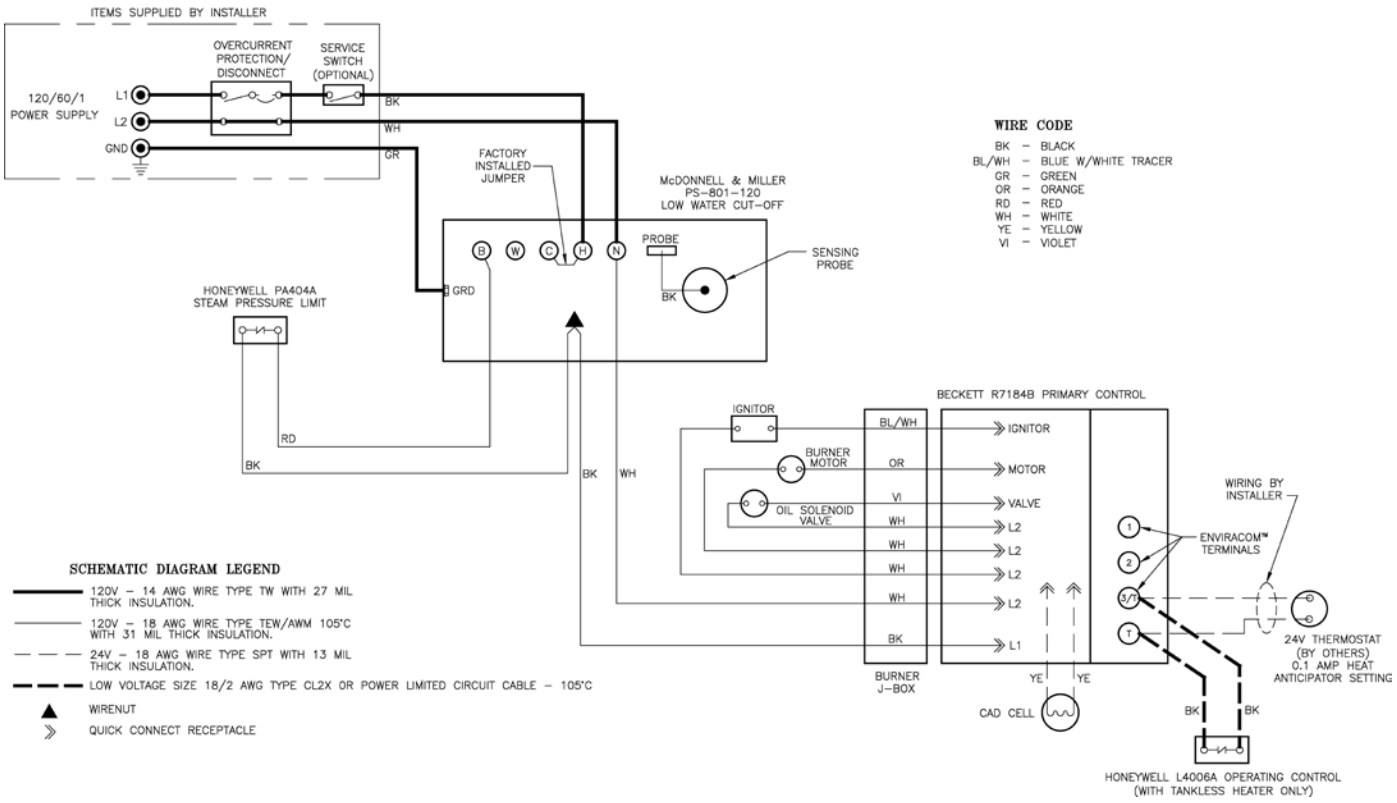


Figure 19: Wiring Diagram, Steam Boilers With or Without Tankless Heater, McDonnell & Miller PS-801 Probe LWCO, Beckett AFG Burner

SEQUENCE OF OPERATION

When the thermostat calls for heat, it energizes the cad cell primary control. The burner will initiate ignition after completing 15 second pre-purge cycle. The burner will operate until the thermostat is satisfied or the limit setting on the high limit is reached. When the high limit control restores the circuit on a drop in pressure, the burner will start if the thermostat is still calling for heat. The low water cut off will shut down the burner if the water level in the boiler drops too low. The control resets and restarts the burner with a call for heat a few seconds after the water is returned to its normal level.

The McDonnell Miller low water cut off incorporates a 10 second delay to prevent nuisance burner cut-off due to rapid water level fluctuations. The LWCO also has a time delay of 15 seconds which allows additional fill time after water touches the probe. Red LED indicates a low water condition.

On burner start, if the cad cell does not see flame within approximately 45 seconds, primary control will lock out on safety and must be reset before burner can be restarted.

When there is no demand for heat, the operating control will maintain the boiler water temperature at the selected setting for proper operation of the domestic water heater, if equipped with optional tankless heater.

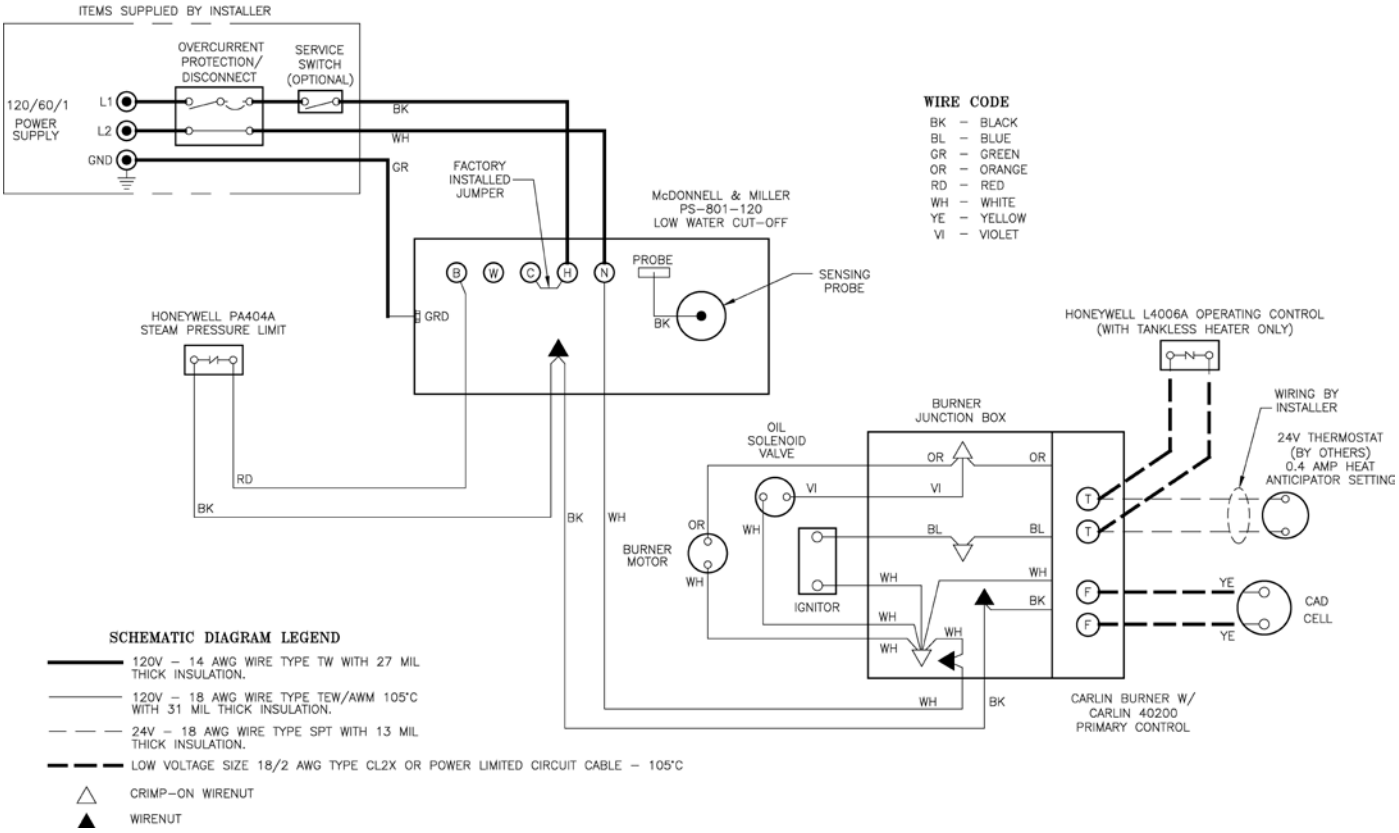


Figure 19A: Wiring Diagram, Steam Boilers With or Without Tankless Heater, McDonnell & Miller PS-801 Probe LWCO, Carlin EZ-HP Burner

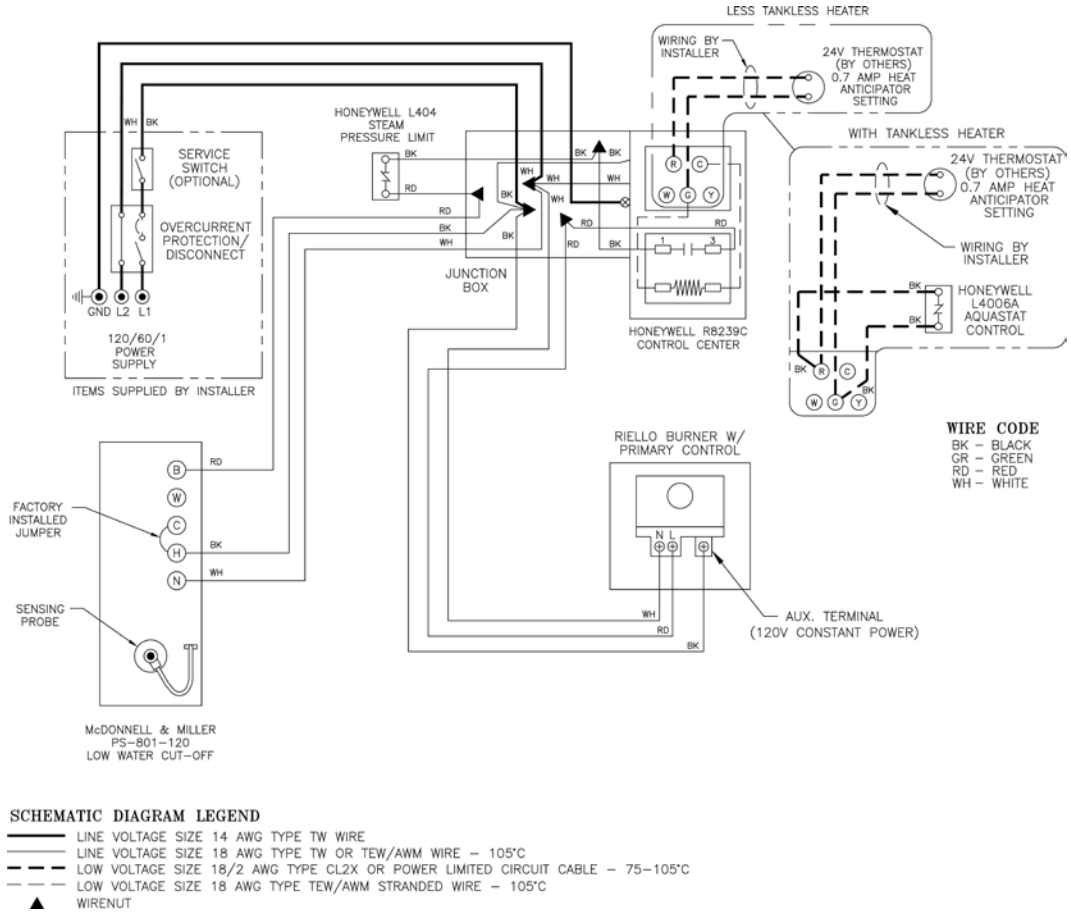

LESS TANKLESS HEATER
WIRING BY INSTALLER
24V THERMOSTAT (BY OTHERS) 0.7 AMP HEAT ANTICIPATOR SETTING
WITH TANKLESS HEATER
HONEYWELL L404 STEAM PRESSURE LIMIT
SERVICE SWITCH (OPTIONAL)
OVERCURRENT PROTECTION/ DISCONNECT
GND L2 L1
120/60/1 POWER SUPPLY
ITEMS SUPPLIED BY INSTALLER
JUNCTION BOX
HONEYWELL R8239C CONTROL CENTER
HONEYWELL L4006A AQUASTAT CONTROL
WIRE CODE
BK - BLACK
GR - GREEN
RD - RED
WH - WHITE
RIELLO BURNER W/ PRIMARY CONTROL
FACTORY INSTALLED JUMPER
SENSING PROBE
AUX. TERMINAL (120V CONSTANT POWER)
McDONNELL & MILLER PS-801-120 LOW WATER CUT-OFF
SCHEMATIC DIAGRAM LEGEND
LINE VOLTAGE SIZE 14 AWG TYPE TW WIRE
LINE VOLTAGE SIZE 18 AWG TYPE TW OR TEW/AWM WIRE - 105°C
LOW VOLTAGE SIZE 18/2 AWG TYPE CL2X OR POWER LIMITED CIRCUIT CABLE - 75-105°C
LOW VOLTAGE SIZE 18 AWG TYPE TEW/AWM STRANDED WIRE - 105°C
WIRENUT

Figure 19B: Wiring Diagram, Steam with or without Tankless Heater, Optional McDonnell & Miller PS-801 Probe LWCO, Riello Burner

III. Indirect Water Heater Piping

A. CONNECT Link SL™ or other Indirect Water Heater Piping as shown in Figures 15 and 16. Refer to Link SL™ or other Indirect Water Heater Instruction Manual for additional installation information.

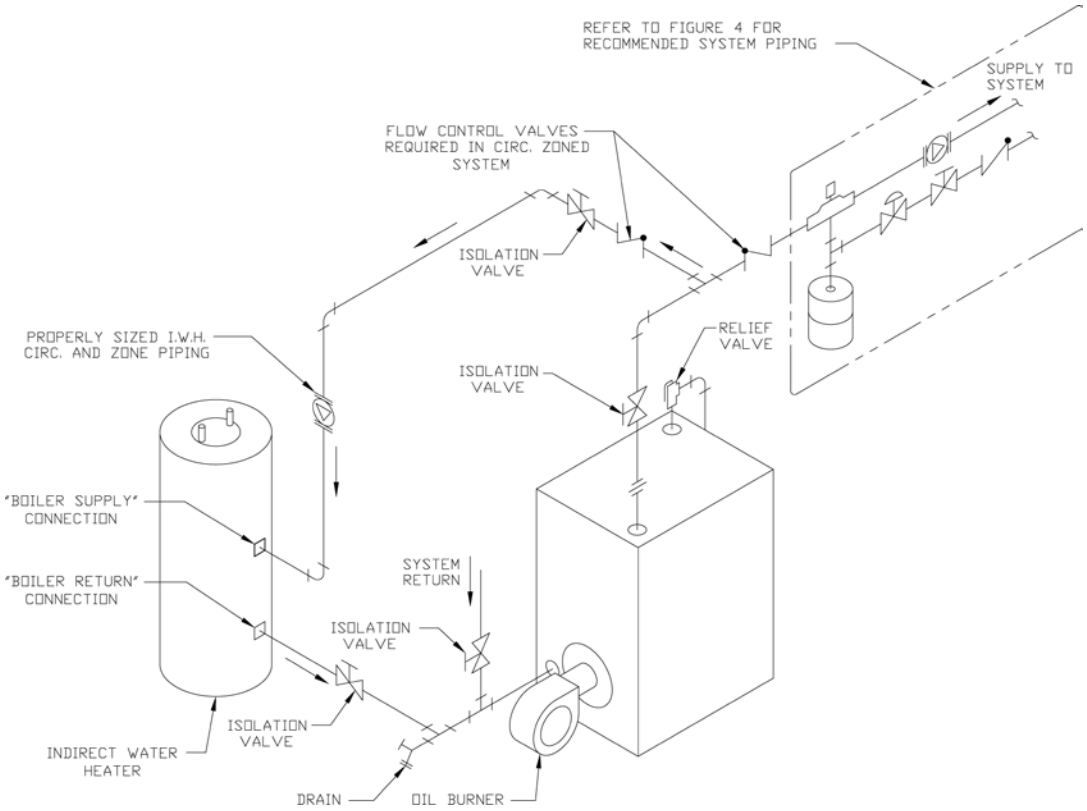


Figure 20: Indirect Water Heater Piping on CL Series Water Boiler

1. CL SERIES WATER BOILER - Figure 20 shows indirect water heater piping on typical hot water heating system. Boiler piping is the same as for any two-zone system. Figure 20 shows circulator zoning, which is usually preferred for indirect water heaters. Size the circulator and indirect water heater piping to obtain the boiler water flow through the indirect water heater called for by the indirect water heater manufacturer. Refer to the indirect water heater instruction manual for additional details.

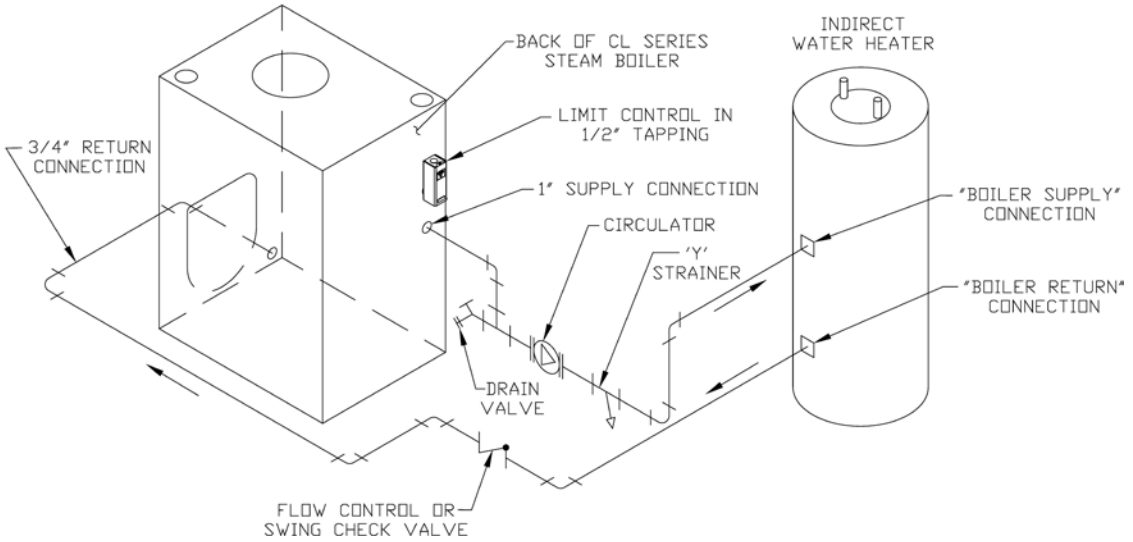


Figure 21: Indirect Water Heater Piping on CL Series Steam Boiler

2. CL SERIES STEAM BOILER - All CL Series steam boilers are equipped with tappings to permit the connect of an Link SL™ or other indirect water heater. In this type of system, hot boiler water is drawn from below the water line and passed through the heat exchanger in the indirect water heater. This section describes boiler-side piping only. Refer to the indirect water heater instruction manual for additional details.

IV. Operating and Service Instructions

A. ALWAYS INSPECT INSTALLATION BEFORE STARTING BURNER.

B. FILL HEATING SYSTEM WITH WATER.

1. Hot Water Boilers: Fill entire Heating System with water and vent air from system. Use the following procedure on a Series Loop System installed as per Figure 9:
   a. Close all but one zone valve.
   b. Open drain valve on boiler.
   c. Open fill valve.
   d. Close purge valve.
   e. Open relief valve on boiler.
   f. Allow water to run out of drain valve until zone has been purged of air and filled with water.
   g. Open zone valve to the second zone to be purged, then close the first. Repeat this step until all zones have been purged but always have one zone open. At completion open all zone valves.
   h. Close drain valve.
   i. When water discharges from relief valve, release the lever on the top of the relief valve, allowing it to close.
   j. Continue filling the system until the pressure gauge reads 12 psi. Close fill valve.

C. CHECK CONTROLS, WIRING AND BURNER to be sure that all connections are tight and burner is rigid, that all electrical connections have been completed and fuses installed, and that oil tank is filled and oil lines have been tested.

D. LUBRICATION

1. Follow instruction on burner and circulator label to lubricate, if oil lubricated. Most motors currently used on residential type burners employ permanently lubricated bearings and thus do not require any field lubrication. Water lubricated circulators do not need field lubrication.
2. Do not over-lubricate. This can cause as much trouble as no lubrication at all.

E. **ADJUST CONTROL SETTINGS** with burner service switch turned "ON".

1. SET ROOM THERMOSTAT about 10°F below room temperature.
2. On WATER BOILERS WITHOUT TANKLESS HEATERS equipped with **L7248** electronic aquastat controller, set High Limit (HL) at 180°F. This temperature can be varied to suit installation requirements. L7248 controller has the High Limit adjustment range from 180°F to 240°F (82°C to 116°C). High Limit Differential is fixed at 15°F (8°C).
3. On WATER BOILERS WITH TANKLESS HEATERS equipped with **L7224** electronic aquastat controller, set operating control (low limit [LL]) at 190°F and high limit (HL) at 210°F. Operating control (low limit) setting must be a minimum of 20°F below high limit setting.

   L7224 controller has the High Limit adjustment range from 130°F to 240°F (55°C to 116°C), and the Low Limit adjustment range from 110°F to 220°F (43°C to 104°C). High Limit Differential is fixed at 10°F (6°C), and Low Limit Differential has adjustment range from 10°F (6°C) to 25°F (14°C).
4. ADJUSTING AQUASTAT CONTROLLER SETTINGS. To discourage unauthorized changing of Aquastat settings, a procedure to enter the **ADJUSTMENT** mode is required. To enter the **ADJUSTMENT** mode, press the **UP, DOWN,** and **I** buttons (refer to Figure 22) simultaneously for three seconds. Press the **I** button until the feature requiring adjustment is displayed:
   - HL_ — High Limit.
   - LL_ — Low Limit.
   - Ldf — Low Limit Differential.
   - °F — °C.

   Then, press the **UP** and/or **DOWN** buttons to move the set point to the desired value. After 60 seconds without any button inputs, the control will automatically return to the **RUN** mode.

   Note that **L7224** Aquastat Controller will display all four (4) above-listed adjustment features, but **L7248** Aquastat Controller **will not** display Low Limit and Low Limit Differential adjustment features.
5. DISPLAY READOUT

   In the **RUN** mode, the Aquastat will flash "bt" (boiler temp) followed by the temperature (i.e., 220), followed by °F or °C.

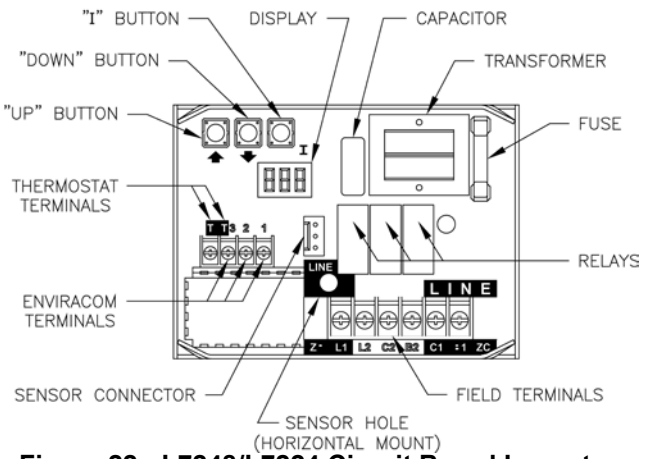


Figure 22: L7248/L7224 Circuit Board Layout - Horizontal Mount

To read boiler settings, press the **I** key to read the parameter of interest. For example, press **I** High Limit (**HL**) is displayed, followed by a three-digit number, i.e., 220, followed by °F or °C. Pressing the I button again (on L7224 models) will display the Low Limit (**LL**) followed by a three-digit number and the corresponding degree designator. See Display Readout, Figure 23.

After approximately 60 seconds without any key presses, the display will enter a dim display mode. To return to the bright display mode, simply press any key.

Text	Description	Display Shows
bt	Boiler Temperature	
HL	High Limit	
LL	Low Limit	
Ldf	Low Limit Differential	
tt	Local Thermostat Status	
tte	Enviracom Thermostat Status	
err	Error Code	
f	Degrees Fahrenheit	
c	Degrees Celsius	

Figure 23: Display Readout Definitions

6. OPERATION

The L7224 model can be in any of four operational states - Normal, High Limit, Low Limit and Error. The controller moves back and forth from High Limit to Normal to Low Limit state as part of normal operation.

The L7248 model is restricted to three operational states - Normal, High Limit and Error. The controller moves back and forth from High Limit to Normal state as part of normal operation.

For both models, the controller will enter the Error state when there is an abnormal condition. The operating states are:

a. Normal: Boiler temperature went below the High Limit setting (minus the Differential) and has not exceeded the High Limit setting; or the boiler temperature went above the Low Limit setting and has not gone below the Low Limit setting (minus the Differential).

b. High Limit: Boiler temperature went above the High Limit setting and has not dropped below the High Limit setting (minus the Differential).

c. Low Limit: Boiler temperature went below the Low Limit setting (minus the Low Limit Differential) and has not gone above the Low Limit setting.

d. Error: The controller has detected an error condition (e.g., open sensor) and has shut down the burner output. The ZC output is energized. The controller continues to monitor the system and automatically restarts if the error condition clears. Refer to Table 6. Refer to Table 8 for Trouble Shooting Guide.

TABLE 6: LED ERROR CODES

Error Code	Cause / Action
Err1	Sensor fault; check sensor.
Err2	ECOM fault; check EnviraCOM™ wiring.
Err3	Hardware fault; replace control.
Err4	B1 fault; check B1 wiring/voltage.
Err5	Low Line; check L1-L2, 110 Vac.
Err6	Fuse; check ECOM wires, replace fuse.
Err7	EEPROM, HL, LL, Hdf, Ldf; reset to default values. Restore desired settings.
Err8	Repeated B1 fault (voltage present at B1 when output is turned off); check B1 wiring/voltage.

The operating sequence for the L7224/L7248 is shown in Table 7.

TABLE 7: L7248/L7224 CONTROLLER OPERATING SEQUENCE

Action	System Response
Thermostat calls for heat.	Circulator starts when water temperature is above Low Limit setting (if applicable). Boiler temperature is checked. Burner starts when water temperature is below High Limit setting.
Boiler exceeds the High Limit.	Burner is turned off. Burner restarts when the water temperature drops below the High Limit setting minus the Differential.
Thermostat is satisfied.	Circulator and burner turn off.
Error condition 1-5.	If an error condition is detected, all outputs except ZC are shut down. Burner is off. Control continues to function and restarts when error is corrected. During the error check sequence, the system checks for drift in the sensor and corrosion in the connections.
Error condition 6.	EnviraCOM communication is not available.
Error condition 7.	The control has reset the High Limit, Low Limit and Differential setting to a default setting and will continue to run at those settings. Performance of the system will be degraded.
Error condition 8.	If the error condition is detected, all outputs except ZC are shut down. Burner is off. Control continues to function and restarts when all three user keys have been pressed longer than 60 seconds.

TABLE 8: TROUBLE SHOOTING GUIDE

System Condition	Diagnostic Condition	Check	Action
Boiler is cold, house is cold.	Display is OFF.	120 Vac System power.	Turn system power on.
	Display is ON.	24 Vac T-T	No 24 V; replace control.
		24 V present; disconnect thermostat, short T-T.	Boiler starts, check wiring and thermostat.
		120 Vac at B1-B2	• If no, replace control. • If yes, check burner and wiring.
		Refer to **Err** on display.	-----
Boiler is hot, house is cold.	Display is ON.	120 Vac at C1-C2	• 120 Vac at C1-C2, check wiring to pump. • Wiring OK, is pump running? • If not, replace the pump. • If pump is running, check for trapped air or closed zone valves
		Boiler below the Low Limit temperature, wait for boiler to go above Low Limit temperature.	-----
		Boiler above LL? If yes, check for 120 Vac between ZC and L2.	• If no 120 Vac , replace control. • If yes, check zone relays, circulators and wiring.

7. HIGH LIMIT CONTROLLER

   The High Limit opens and turns off the burner when the water temperature reaches the setpoint. The High Limit automatically resets after the water temperature drops past the setpoint and through the Differential. The L7248 models have High Limit Differential presets of 15°F (8°C). The L7224 models have High Limit Differential presets of 10°F (6°C).

8. LOW LIMIT AND CIRCULATOR CONTROLLER

   On a temperature rise, with the adjustable Differential at the default setting of 10°F (6°C), the burner circuit breaks and the circulator circuit makes (assuming no call for heat is present) at the Low Limit setpoint. On a temperature drop of 10°F (6°C) below the Low Limit setpoint, the burner circuit makes and the circulator circuit breaks. See Figure 24.

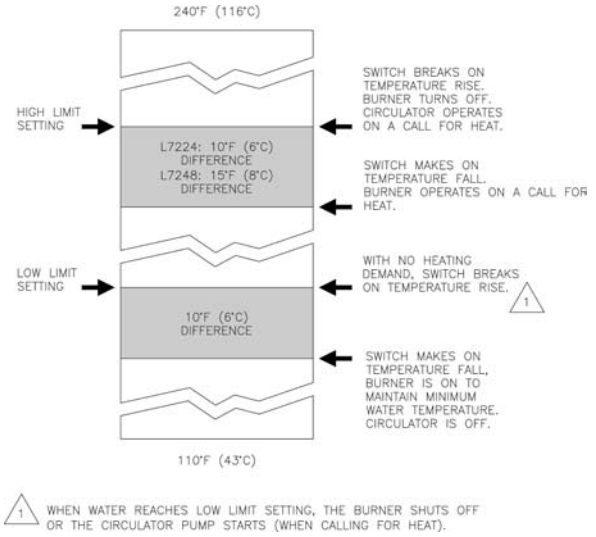
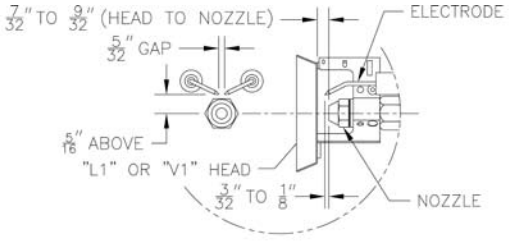

240°F (116°C)
HIGH LIMIT SETTING
L7224: 10°F (6°C) DIFFERENCE
L7248: 15°F (8°C) DIFFERENCE
LOW LIMIT SETTING
10°F (6°C) DIFFERENCE
110°F (43°C)
SWITCH BREAKS ON TEMPERATURE RISE. BURNER TURNS OFF. CIRCULATOR OPERATES ON A CALL FOR HEAT.
SWITCH MAKES ON TEMPERATURE FALL. BURNER OPERATES ON A CALL FOR HEAT.
WITH NO HEATING DEMAND, SWITCH BREAKS ON TEMPERATURE RISE. 1
SWITCH MAKES ON TEMPERATURE FALL, BURNER IS ON TO MAINTAIN MINIMUM WATER TEMPERATURE. CIRCULATOR IS OFF.
1 WHEN WATER REACHES LOW LIMIT SETTING, THE BURNER SHUTS OFF OR THE CIRCULATOR PUMP STARTS (WHEN CALLING FOR HEAT).

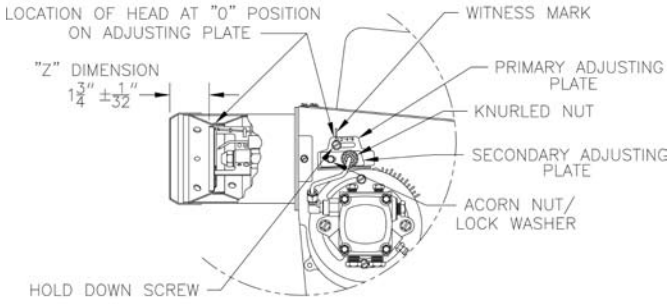
Figure 24: Setpoints and Differentials

F. REMOVE GUN ASSEMBLY

1. CL Series boilers are equipped with Beckett AFG burners. Items to be checked are nozzle size, head size, gun setting, and positioning of electrodes. This information is shown in Figure 25 and Table 9 at rear of manual.
2. CL Series boilers are equipped with Carlin EZ-HP burners. Items to be checked are nozzle size, head bar size, gun setting, and positioning of electrodes. This information is shown in Figure 25A and Table 9 at rear of manual.
3. Reinstall gun assembly.



ELECTRODE ADJUSTMENT



HEAD SETTING (AT "0")

Figure 25: "L1" and "V1" Head Electrode Positioning and Gun Setting (Beckett AFG)

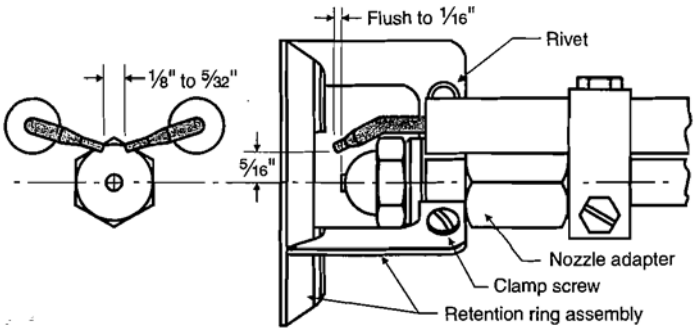


Figure 25A: Electrode Settings (Carlin EZ-HP)

G. ADJUST OIL BURNER BEFORE STARTING.

1. SET BURNER AIR BAND AND AIR SHUTTER, see Table 9 at rear of manual.
2. Inspect Beckett head setting on left side of burner by insuring the blue line MD(V1) or the line on the label MB(L1) are aligned, readjust if necessary. Refer to Figure 25.
3. Inspect Carlin head setting on left side of burner to ensure that the proper head positioning bar matches the nozzle that is installed in drawer assembly. Replace bar if necessary.

   Carlin burners for boiler models CL3-140 and CL4-210 have the higher firing rate nozzle installed and two (2) loose nozzles with a head positioning bar kit attached to the nozzle line. Refer to Table 9 for proper nozzle size, air settings and fuel pump pressure setting based on desired firing rate.

   If the desired firing rate is the lower GPH:

   a. replace the factory installed high firing rate nozzle with one of the loose lower firing rate nozzles.

   b. replace the factory installed head positioning bar with the corresponding head bar that matches the lower GPH nozzle installed, see Table 9.

   c. change the factory air settings according to Table 9 and,

   d. check the oil pump pressure and adjust if necessary to the setting specified in Table 9, refer to Paragraph H, Step 5 for details.
4. INSPECT RIELLO BURNER AIR DAMPER AND TURBULATOR SETTING, readjust if necessary, see Table 9a.
   a. Remove pressure port/bleeder plug from fuel pump and install Riello Combination Pressure Gauge and Bleeder Valve Assembly.
5. OPEN ALL OIL LINE VALVES.
6. ATTACH A PLASTIC HOSE TO FUEL PUMP VENT FITTING and provide a pan to catch the oil.
7. OPEN FLAME OBSERVATION DOOR on front of boiler.

H. START OIL BURNER.

1. Open vent fitting on fuel pump.
2. TURN 'ON' BURNER service switch and allow burner to run until oil flows from vent fitting in a SOLID stream without air bubbles for approximately 10 seconds.
3. Close vent fitting and burner flame should start immediately after pre-purge is complete. Pre-purge prevents burner flame until 15 seconds has elapsed after initial power is applied to burner. During pre-purge, the motor and ignitor will operate but the oil valve will remain closed. Refer to Oil Primary Control Instructions for more details.

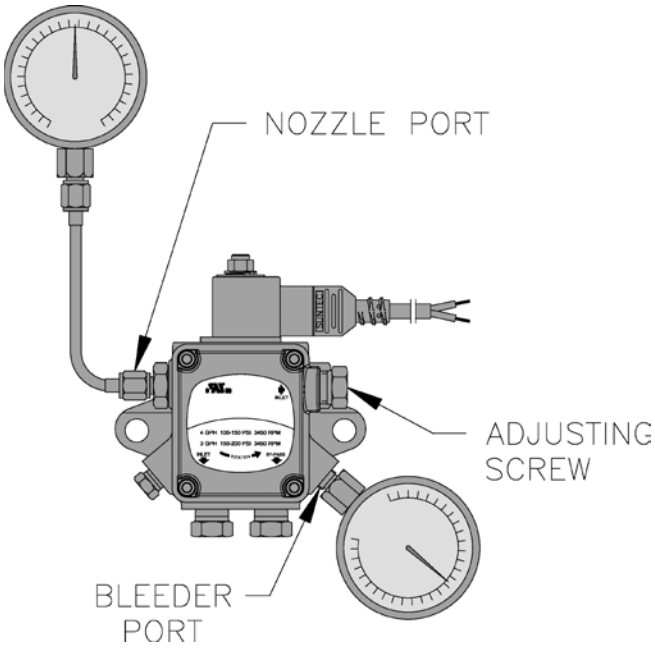


Figure 26: Adjusting Fuel Pump Pressure

4. ADJUST OIL PRESSURE for Beckett AFG burners (shut the burner off).
   a. When checking a fuel unit's operating pressure, a reliable pressure gauge may be installed in either the bleeder port or the nozzle port. See Figure 26.

   b. Locate oil pressure adjusting screw and turn screw for appropriate pump pressure, refer to Table 9 at rear of manual.

   c. To check the cutoff pressure, deadhead a reliable pressure gauge onto the copper connector tube attached to the nozzle port. Run the burner for a short period of time. Shut the burner off. The pressure should drop and hold.

   d. Remove the gauge and install bleeder port and/or reconnect the nozzle port line.
5. VERIFY/ADJUST FUEL PUMP PRESSURE for Carlin EZ-HP burners.
   a. Turn "off" burner service switch.

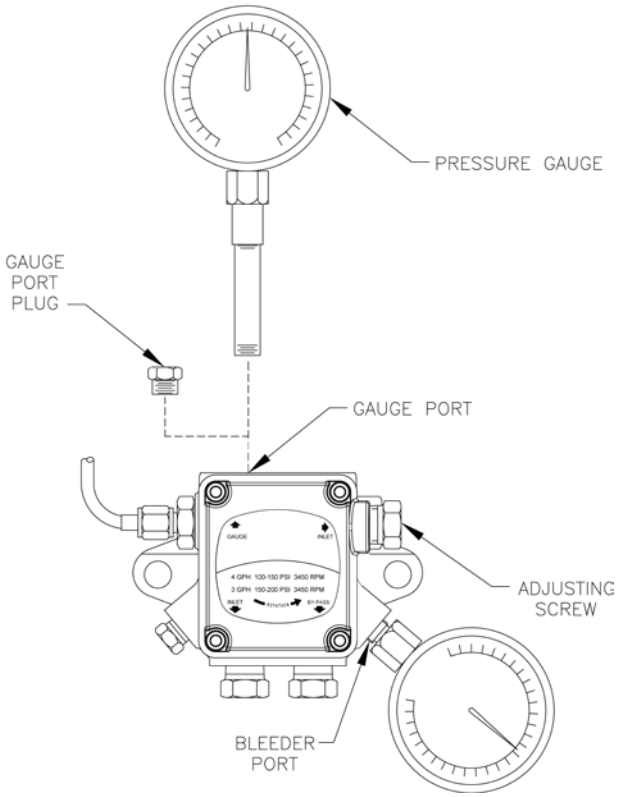


Figure 26A: Adjusting Fuel Pump Pressure

b. When checking a fuel pump's operating pressure, a reliable pressure gauge may be installed in either the gauge port or the bleeder port. See Figure 26A.

6. VERIFY/ADJUST OIL PRESSURE for Riello 40 burner.

   Adjust oil pressure. Locate oil pressure adjusting screw and turn screw to obtain proper pump pressure, refer to Figure 8 and Table 9A.

I. ADJUST OIL BURNER WHILE OPERATING. (flame present)

1. ADJUST DRAFT REGULATOR for a draft of -0.02" (water gauge) over the fire after chimney has reached operating temperature and while burner is running.
2. READJUST THE AIR DAMPER SETTING on the burner for a light orange colored flame while the draft over the fire is -0.02". Use a smoke tester and adjust air for minimum smoke (not to exceed #1) with a minimum of excess air. Make final check using suitable instrumentation to obtain a CO_2 of 11.5 to 12.5% with draft of -0.02" (water gauge) in fire box. These settings will assure a safe and efficient operating condition. If the flame appears stringy instead of a solid fire, try another nozzle of the same type. Flame should be solid and compact. After all adjustments are made recheck for a draft of -0.02" over the fire.
3. READJUST THE TURBULATOR SETTING only if necessary.

   a. CL3 through CL5

      Move the turbulator setting forward or back one position at a time to optimize the smoke and CO_2 readings.

4. Turn "OFF" burner and remove Riello Combination Pressure Gauge and Bleeder Valve Assembly. Install pressure port/bleeder plug and tighten. Start burner again.
5. FLAME FAILURE

   The CL Series boiler controls operate the burner automatically. If for unknown reasons the burner ceases to fire and the reset button on the primary control has tripped, the burner has experienced ignition failure. Before pressing the reset button call your heating contractor immediately.

WARNING

Do not attempt to start the burner when excess oil has accumulated, when the unit is full of vapor, or when the combustion chamber is very hot.

7. CAD CELL LOCATION AND SERVICE
   The burner is supplied with a cadmium sulfide flame detector mounted at the factory, mounted on the bottom of the electronic ignitor. See Figure 27. To service cad cell or to replace the plug in portion, swing open the ignitor. After service is complete, be sure to fasten down the ignitor.

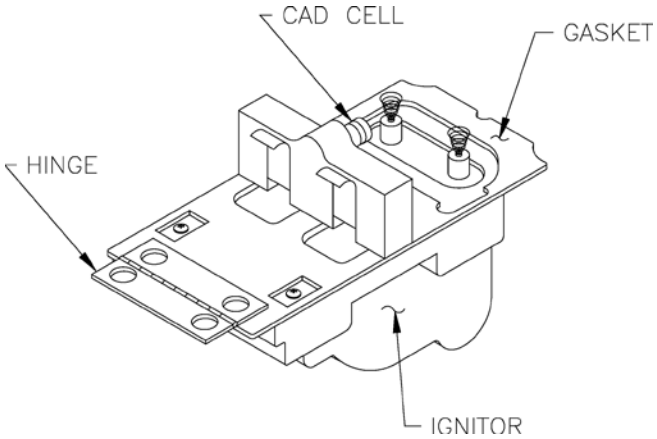


Figure 27: Cad Cell Location

J. CHECK FOR CLEAN CUT OFF OF BURNER.

1. AIR IN THE OIL LINE between fuel unit and nozzle will compress when burner is on and will expand when burner stops, causing oil to squirt from nozzle at low pressure as burner slows down and causing nozzle to drip after burner stops. Usually cycling the burner operation about 5 to 10 times will rid oil line of this air.
2. IF NOZZLE CONTINUES TO DRIP, repeat Paragraph J, Step 1. If this does not stop the dripping, remove cutoff valve and seat, and wipe both with a clean cloth until clean, then replace

and readjust oil pressure. If dripping or after burn persist replace fuel pump.

K. TEST CONTROLS.

WARNING

Before installation of the boiler is considered complete, the operation of all boiler controls must be checked, particularly the primary control and high limit control.

1. CHECK THERMOSTAT OPERATION. Raise and lower thermostat setting as required to start and stop burner.
2. VERIFY PRIMARY CONTROL SAFETY FEATURES using procedures outlined in Instructions furnished with control or instructions as follows:

CHECKOUT PROCEDURE

a. Check wiring connections. Close line switch. Check power at control.

PRIMARY RELAY TEST

b. Disconnect cad cell leads from quick connects on underside at primary control. Reset safety switch.
c. Set controller to call for heat. Burner should start.
d. Jumper the quick connect terminals within 15 to 30 seconds. Burner should run.
e. Remove the quick connect terminals jumper. Burner shuts down in approximately 15 to 60 seconds.
f. If burner operates as described, relay is good. If not, install new relay.

CAD CELL TEST (see Figure 27)

g. Open line switch. Clean cell face and see that cell is securely in socket. Reconnect leads. Reset safety switch.
h. Close line switch. If burner starts and runs beyond safety switch cut-out time, cell is good. If not, install new cell.

3. WARNING — Check High Limit Control — Jumper Thermostat Terminals. Allow burner to operate until shut-down by limit. Installation is not considered complete until this check has been made.

   REMOVE JUMPER.

4. Check low water cut off control with water level at normal water line (see Figures 1C and 1D). Raise thermostat setting to allow burner to operate. Open boiler drain to allow water level to drop to bottom of sight glass until burner operation is shut-down by low water cut-off.

   Close boiler drain and refill to normal water line. Burner should automatically restart during fill. Lower thermostat setting.

5. CHECK OPERATING CONTROL on boiler equipped with tankless heaters. With burner off, draw hot water until burner starts, then turn off hot water and check burner shut-down.

IF CONTROLS DO NOT MEET REQUIREMENTS AS OUTLINED ABOVE, REPLACE CONTROL AND REPEAT CHECK-OUT PROCEDURES.

V. Maintenance and Service Instructions

A. MAINTENANCE OF LOW WATER CUT-OFF DEVICES

WARNING

Probe and float type low water cut-off devices require annual inspection and maintenance.

1. Although these devices are solid state in their operation, the probe is exposed to possible contamination in the boiler water and subject to fouling.
2. It is important to physically remove the probe from the boiler tapping annually and inspect that probe for accumulation of scale or sediment.
3. Follow these steps to inspect, clean and/or replace the probe:
   a. Turn off electric service to the boiler.
   b. Drain boiler water to a level below the tapping for the probe.

DANGER

Assure that the boiler is at zero pressure before removing the LWCO probe. Do not rely on the pressure gauge to indicate that the boiler is at zero pressure. Open the safety valve to relieve all internal pressure prior to proceeding. Safety valve discharge piping must be piped such that the potential for burns is eliminated.

   c. Disconnect wiring connections between the low water cut-off control and the probe.
   d. Remove the low water cut-off control from the probe.
   e. Unscrew the probe from the boiler tapping.
   f. Inspect that portion of the probe that is exposed to the boiler water for a scale or sediment buildup.
   g. Light deposits may be removed by wiping the probe with a damp cloth. Wiping the probe with a cloth soaked in vinegar will remove more tenacious lime deposits. The most stubborn deposits may be removed from the probe by using a diluted amount, 3 parts of water to 1 part of phosphoric acid (H_2PO_4).

CAUTION

Exercise caution when handling phosphoric acid and follow the instruction label on its container.

   h. Clean the pipe threads of the probe to remove old, hardened pipe dope and other foreign matter.
   i. Apply a moderate amount of good quality pipe dope to the pipe threads on the probe, leaving the two end threads bare. Do not use PTFE (Teflon) tape.
   j. Screw the probe into the boiler tapping.
   k. Mount the low water cut-off control on the probe.
   l. Reconnect the control to probe wiring.
   m. Fill the boiler to its normal waterline.
   n. Add boiler water treatment compound as needed (refer to Paragraph B.).
   o. Restore electric service to the boiler.
   p. Fire burner to bring the water in the boiler to a boil to drive off free oxygen.
   q. WARNING — BEFORE RETURNING BOILER TO SERVICE: Follow the low water cut-off check out procedure in Section IV. Operating & Service Instructions.

B. BOILER AND SYSTEM CLEANING INSTRUCTIONS FOR TROUBLE FREE OPERATION.

1. STEAM BOILERS:
   a. Oil, greases & sediments which accumulate in a new boiler and piping must be removed from the system in order to prevent an unsteady water line and carry over of the water into the supply main above boiler.

      Operate the boiler with steam in the entire system for a few days allowing the condensate to return to the boiler. If the condensate can temporarily be wasted, operate boiler only for the length of time it takes for condensate to run clear. If the latter cannot be achieved or if the condensate is returned to the boiler, boil out the boiler using the SURFACE BLOW-OFF connection.

      i. Drain boiler until 1" of water is visible in gauge glass. Run temporary 1½" NPT pipe line from the surface blow-off connection to an open drain or some other location where hot water may be discharged safely. Do not install valve in this line.

      ii. Drain about 5 gallons of hot water from boiler into a container and dissolve into it an appropriate amount of recommended boil out compound. Remove safety valve & add solution to boiler water thru exposed tapping using a funnel.

NOTICE

Check with local authorities or consult local water treatment services for acceptable chemical cleaning compounds.

iii. Start burner and operate sufficiently to boil the water without producing steam pressure. Boil for about 5 hours. Open boiler feed pipe sufficiently to permit a steady trickle of water from the surface blow-off pipe. Continue this slow boiling and trickle of overflow for several hours until the water coming from the overflow is clear.

iv. Stop burner and drain boiler in a manner and to a location that hot water can be discharged with safety.

v. Refill boiler to normal water line. If water in gauge glass does not appear to be clear, repeat steps (*i*. thru *iii*.) and boil out the boiler for a longer time.

b. Low pressure steam boilers such as the CL Series should be maintained with appropriate water treatment compounds. Add suitable water treatment compounds as recommended by your qualified water treatment company.

c. Remove temporary surface blow-off piping, plug tapping and reinstall safety valve. Boil or bring water temperature to 180°F promptly in order to drive off the dissolved gases in the fresh water.

d. If unsteady water line, foaming or priming persist, install gate valve in Hartford Loop and drain valves in return main and at boiler as shown in Figure 9 and proceed as follows:

i Connect hoses from drain valves to floor drain. Close gate valve in Hartford Loop and open drain valve in return main. Fill boiler to normal water level, turn on oil burner and operate boiler at this water level for at least 30 minutes after the condensate begins to run hot, then turn off burner.

Close all radiator valves. Remove all supply main air valves and plug the openings in supply main.

ii. Draw about 5 gallons of hot water from boiler into a container and dissolve into it the appropriate amount of a recommended boilout compound. Remove safety valve from boiler and pour this solution into boiler, then reinstall safety valve.

iii. Turn on oil burner and keep operating while feeding water to boiler slowly. This will raise water level in boiler slowly so that water will be boiling hot and will rise slowly into supply main and back through return main, flowing from drain hose at about 180°F. Continue until water runs clear from drain hose for at least 30 minutes.

iv. Stop feeding water to boiler but continue operating oil burner until excess water in boiler flows out through supply main and water lowers (by steaming) until it reaches normal level in boiler. Turn off oil burner. Drain boiler. Open all radiator valves. Reinstall all supply main air valves. Open gate valve in Hartford Loop.

v. When boiler has cooled down sufficiently (crown sheet of sections are not too hot to touch), close the drain valves at boiler and in return main and feed water slowly up to normal level in boiler. Turn on oil burner and allow boiler to steam for 10 minutes, then turn off burner. Draw off one quart of water from bottom gauge glass fitting and discard. Draw off another quart sample and if this sample is not clear, repeat the cycle of draining the boiler and return main and refilling the boiler until sample is clear.

vi. If the boiler water becomes dirty again at a later date due to additional sediment loosened up in the piping, close gate valve in Hartford Loop, open drain valve in return main, turn on oil burner and allow Condensate to flow to drain until it has run clear for at least 30 minutes while feeding water to boiler so as to maintain normal water level. Turn off oil burner, drain boiler, open gate valve in Hartford Loop, then repeat the full "Boiler and System Cleaning" procedure outlined in Paragraph B starting on Page 30.

e. Make pH or Alkalinity Test.

After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading in pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or through your local druggist. The pH should be higher than 7, but lower than 11. Add some of the washout chemical (caustic soda), if necessary, to bring the pH within the specified range.

f. Boiler is now ready to be put into service.

2. WATER BOILERS:

a. Filling of boiler and system.

GENERAL — In a hot water heating system, the boiler and entire system (other than the expansion tank) must be full of water for satisfactory operation. Water should be added to the system until the boiler pressure gauge registers 12 psi. To insure that the system is full,

water should come out of all air vents when opened.

b. BOILING OUT OF BOILER AND SYSTEM. The oil and grease which accumulate in a new hot water boiler can be washed out in the following manner:
   i. Remove relief valve using extreme care to avoid damaging it.
   ii. Add an appropriate amount of recommended boil out compound.
   iii. Replace relief valve.
   iv. Fill the entire system with water.
   v. Start firing the boiler.
   vi. Circulate the water through the entire system.
   vii. Vent the system, including the radiation.
   viii. Allow boiler water to reach operating temperature, if possible.
   ix. Continue to circulate the water for a few hours.
   x. Stop firing the boiler.
   xi. Drain the system in a manner and to a location that hot water can be discharged with safety.
   xii. Remove plugs from all available returns and wash the water side of the boiler as thoroughly as possible, using a high-pressure water stream.
   xiii. Refill the system with fresh water.

c. Add appropriate boiler water treatment compounds as recommended by your qualified water treatment company.

d. Make pH or Alkalinity Test.

   After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or through your local druggist. The pH should be higher than 7 but lower than 11. Add some of the washout chemical (caustic soda), if necessary, to bring the PH within the specified range.

e. Boiler is now ready to be put into service.

3. EXCESSIVE MAKE-UP WATER

A leaky system will increase the volume of make-up water supplied to the boiler, which can significantly shorten the life of the boiler. Entrained in make-up water are dissolved minerals, salts and oxygen. When the fresh, cool make-up water is heated in the boiler, the minerals fall out as sediment, the salts

IMPORTANT

IF, DURING NORMAL OPERATION, IT IS NECESSARY TO ADD MORE WATER THAN INDICATED BELOW, CONSULT A QUALIFIED SERVICE TECHNICIAN TO CHECK YOUR SYSTEM FOR LEAKS.

Model No.	Gallons Per Month	Gallons Per Year
CL3	0.3	4
CL4	0.4	5
CL5	0.5	6

coat the inside of the boiler, and the oxygen escapes as a gas. The accumulation of sediment eventually isolates the water from contacting the cast iron. When this happens the cast iron in that area gets extremely hot and eventually cracks. The presence of free oxygen or chloride salts in the boiler corrodes the cast iron from the inside. More make-up water and higher concentrations of contaminants damage the boiler sooner. **Our warranty does not cover corrosion and sediment-related damage.** Clearly it is in everyone's best interest to prevent this type of failure. You can do your part by ensuring that your system is leak-free, keeping leakage to less than 2 percent of the total water volume each month.

C. HINTS ON COMBUSTION

1. NOZZLES — Although the nozzle is a relatively inexpensive device, its function is critical to the successful operation of the oil burner. The selection of the nozzle supplied with the CL boiler is the result of extensive testing to obtain the best flame shape and efficient combustion. Other brands of the same spray angle and spray pattern may be used but may not perform at the expected level of CO_2 and smoke. Nozzles are delicate and should be protected from dirt and abuse. Nozzles are mass-produced and can vary from sample to sample. For all of those reasons a spare nozzle is a desirable item for a serviceman to have.
2. FUEL LEAKS — Any fuel leak between the pump and the nozzle will be detrimental to good combustion results. Look for wet surfaces in the air tube, under the ignitor, and around the air inlet. Any such leaks should be repaired as they may cause erratic burning of the fuel and in the extreme case may become a fire hazard.
3. AIR LEAKS — Any such leaks should be repaired, as they may cause erratic burning of the fuel and in extreme cases may become a fire hazard.

SUCTION LINE LEAKS -

Whatever it takes, **The Oil Must Be Free of Air**. This can be a tough problem , but it must be resolved. Try

bleeding the pump through a clear tube. There must be no froth visible. There are various test kits available to enable you to look at the oil through clear tube. There must be no froth visible. There are various test kits available to enable you to look at the oil through clear tubing adapted to the supply line at the pump fitting. Air eliminators are on the market that have potential. Also, electronic sight glasses are being used with good success. At times, new tubing must be run to the tank or new fittings put on. Just make sure you get the air out before you leave.
Any air leaks in the fuel line will cause an unstable flame and may cause delayed ignition noises. Use only flare fittings in the fuel lines.

4. GASKET LEAKS — If 11.5 to 12.5% CO_2 with a #1 smoke cannot be obtained in the breeching, look for air leaks around the burner mounting gasket, observation door, and canopy gasket. Such air leaks will cause a lower CO_2 reading in the breeching. The smaller the firing rate the greater effect an air leak can have on CO_2 readings.
5. DIRT — A fuel filter is a good investment. Accidental accumulation of dirt in the fuel system can clog the nozzle or nozzle strainer and produce a poor spray pattern from the nozzle. The smaller the firing rate, the smaller the slots become in the nozzle and the more prone to plugging it becomes with the same amount of dirt.
6. WATER — Water in the fuel in large amounts will stall the fuel pump. Water in the fuel in smaller amounts will cause excessive wear on the pump, but more importantly water doesn't burn. It chills the flame and causes smoke and unburned fuel to pass out of the combustion chamber and clog the flueways of the boiler.
7. COLD OIL — If the oil temperature approaching the fuel pump is 40°F or lower poor combustion or delayed ignition may result. Cold oil is harder to atomize at the nozzle. Thus, the spray droplets get larger and the flame shape gets longer. An outside fuel tank that is above grade or has fuel lines in a shallow bury is a good candidate for cold oil. The best solution is to bury the tank and lines deep enough to keep the oil above 40°F.
8. FLAME SHAPE — Looking into the combustion chamber through the observation door, the flame should appear straight with no sparklers rolling up toward the crown of the chamber. If the flame drags to the right or left, sends sparklers upward or makes wet spots on the target wall, the nozzle should be replaced. If the condition persists look for fuel leaks, air leaks, water or dirt in the fuel as described above.
9. HIGH ALTITUDE INSTALLATIONS
   Air settings must be increased at high altitudes. Use instruments and set for 11.5 to 12.5% CO_2.
10. START-UP NOISE — Late ignition is the cause of start-up noises. If it occurs recheck for electrode settings, flame shape, air or water in the fuel lines.
11. SHUT DOWN NOISE — If the flame runs out of air before it runs out of fuel, an after burn with noise may occur. That may be the result of a faulty cut-off valve in the fuel pump, or it may be air trapped in the nozzle line. It may take several firing cycles for that air to be fully vented through the nozzle. Water in the fuel or poor flame shape can also cause shut down noises.

NOTICE

CHECK TEST PROCEDURE. A very good test for isolating fuel side problems is to disconnect the fuel system and with a short length of tubing, fire out of an auxiliary five gallon pail of clean, fresh, warm #2 oil from another source. If the burner runs successfully when drawing out of the auxiliary pail then the problem is isolated to the fuel or fuel lines being used on the jobsite.

D. ATTENTION TO BOILER WHILE NOT IN OPERATION

1. IMPORTANT

   IF BOILER IS NOT USED DURING WINTER TIME, IT MUST BE FULLY DRAINED TO PREVENT FREEZE DAMAGE.
2. Spray inside surfaces with light lubricating or crankcase oil using gun with extended stem so as to reach all corners.
3. With steam boilers, at end of season add sufficient water to fill boiler to top of water column and leave it that way until fall when water should be drained again to proper level. If, at this time, boiler water is dirty, drain water, flush out boiler, and refill with clean water to prescribed water level.
4. Always keep the manual fuel supply valve shut off if the burner is shut down for an extended period of time.
5. To recondition the heating system in the fall season after a prolonged shut down, follow the instructions outlined in Section IV, Paragraphs A through K.

WARNING

This boiler contains controls which may cause the boiler to shut down and not restart without service. If damage due to frozen pipes is a possibility, the heating system should not be left unattended in cold weather; or appropriate safeguards and alarms should be installed on the heating system to prevent damage if the boiler is inoperative.

VI. Boiler Cleaning

WARNING

All boiler cleaning must be completed with burner service switch turned off.

A. CLEAN THE FLUEWAYS (See Figure 28).

1. Disconnect oil line(s) and remove burner and burner mounting plate. See Figures 1A thru 1D.
2. Lay protective cloth or plastic over combustion chamber blanket.
3. Remove the smokepipe as necessary to gain access to the boiler canopy.
4. Remove the jacket top panels.
5. Remove the canopy being careful not to damage the cerafelt gasket.
6. Using a 1¼" diameter wire or fibre bristle brush (30" handle) clean the flueways. Brush from the top using diagonal strokes for best results. DO NOT allow brush to strike the target wall or liner in the chamber.

B. CLEAN TOP OF BOILER SECTIONS.

1. Brush and vacuum the tops of the boiler sections.

C. CLEAN THE FIREBOX.

1. Using wire or fibre bristle brush, clean crown of boiler and inside of water legs. DO NOT allow brush to strike target wall or blanket in the combustion chamber.

D. AFTER CLEANING, remove protective cloth with debris and vacuum as necessary, but be careful not to damage blanket. Inspect target wall, combustion chamber blanket and burner mounting plate insulation for signs of damage. If damaged, replace as needed.

E. REASSEMBLE BOILER.

CAUTION: Do not start the burner unless canopy, smokepipe and burner swing door are secured in place.

1. Install the canopy taking care to align the gaskets without blocking the flueways. If gasket is damaged, replace as needed.
2. Close and secure burner swing door to front section with fasteners.
3. Reconnect oil line(s).
4. Reinstall Top Panels and secure with sheet metal screws.
5. Reinstall smokepipe on canopy and secure to collar with sheet metal screws.

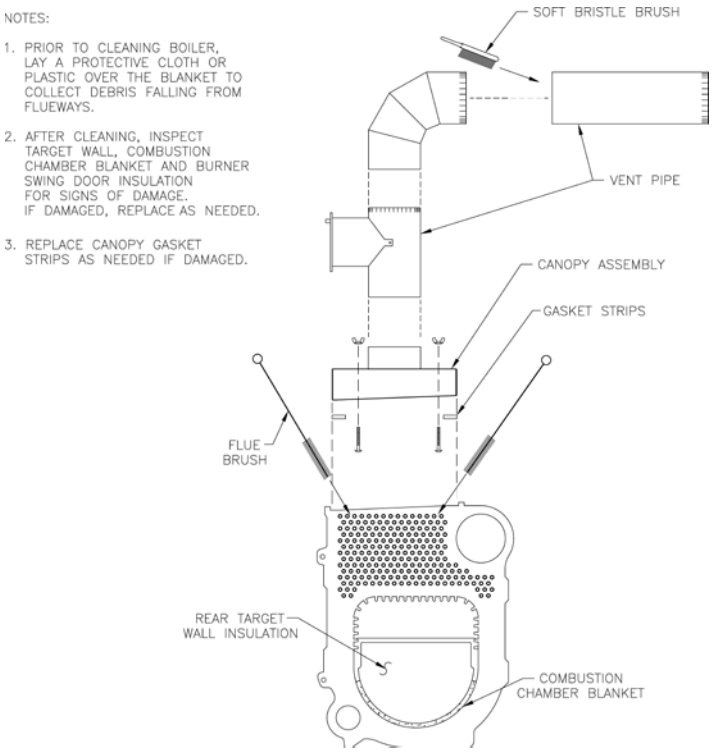

NOTES:
1. PRIOR TO CLEANING BOILER, LAY A PROTECTIVE CLOTH OR PLASTIC OVER THE BLANKET TO COLLECT DEBRIS FALLING FROM FLUEWAYS.
2. AFTER CLEANING, INSPECT TARGET WALL, COMBUSTION CHAMBER BLANKET AND BURNER SWING DOOR INSULATION FOR SIGNS OF DAMAGE. IF DAMAGED, REPLACE AS NEEDED.
3. REPLACE CANOPY GASKET STRIPS AS NEEDED IF DAMAGED.
SOFT BRISTLE BRUSH
VENT PIPE
CANOPY ASSEMBLY
GASKET STRIPS
FLUE BRUSH
REAR TARGET WALL INSULATION
COMBUSTION CHAMBER BLANKET

Figure 28: Cleaning of Boiler Flueways

WARNING

The boiler must be connected to an approved chimney in good condition. Serious property damage could result if the boiler is connected to a dirty or inadequate chimney. The interior of the chimney flue must be inspected and cleaned before the start of the heating season and should be inspected periodically throughout the heating season for any obstructions. A clean and unobstructed chimney flue is necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.

Important Product Safety Information
Refractory Ceramic Fiber Product

Warning:

The Repair Parts list designates parts that contain refractory ceramic fibers (RCF). RCF has been classified as a possible human carcinogen. When exposed to temperatures about 1805°F, such as during direct flame contact, RCF changes into crystalline silica, a known carcinogen. When disturbed as a result of servicing or repair, these substances become airborne and, if inhaled, may be hazardous to your health.

AVOID Breathing Fiber Particulates and Dust

Precautionary Measures:

Do not remove or replace RCF parts or attempt any service or repair work involving RCF without wearing the following protective gear:

1. A National Institute for Occupational Safety and Health (NIOSH) approved respirator
2. Long sleeved, loose fitting clothing
3. Gloves
4. Eye Protection

- Take steps to assure adequate ventilation.
- Wash all exposed body areas gently with soap and water after contact.
- Wash work clothes separately from other laundry and rinse washing machine after use to avoid contaminating other clothes.
- Discard used RCF components by sealing in an airtight plastic bag. RCF and crystalline silica are not classified as hazardous wastes in the United States and Canada.

First Aid Procedures:

- If contact with eyes: Flush with water for at least 15 minutes. Seek immediate medical attention if irritation persists.
- If contact with skin: Wash affected area gently with soap and water. Seek immediate medical attention if irritation persists.
- If breathing difficulty develops: Leave the area and move to a location with clean fresh air. Seek immediate medical attention if breathing difficulties persist.
- Ingestion: Do not induce vomiting. Drink plenty of water. Seek immediate medical attention.

TROUBLE SHOOTING CARLIN 40200 OIL PRIMARY CONTROL

CARLIN 40200 OIL PRIMARY CONTROL

Also refer to Model EZ-1/2/3 Oil Burner - Instruction Manual (Form #MNEZ123) for additional information.

1. Burner (control) will not come on.
   a. No power to control.
   b. Control is in lockout. Press reset button for one (1) second.
   c. CAD cell seeing light.
   d. CAD assembly defective.
   e. Control motor relay is stuck closed (see note below).
2. Burner (control) will light, then shut down after a short time, then restart after one (1) minute.
   a. CAD cell is defective.
   b. Air leaking into oil line causing flame out.
   c. Defective nozzle causing flame to be erratic.
   d. Excessive airflow or draft causing flame to be erratic.
   e. Excessive back pressure causing flame to be erratic.
3. Control locks out after Trial For Ignition (TFI).
   a. No oil to burner.
   b. Shorted electrodes.
   c. Nozzle clogged.
   d. Airflow too high.
   e. Ignitor module defective.
   f. CAD cell defective.
   g. Oil valve stuck open or closed.

   Note: The Safety Monitoring Circuit (SMC) is designed to provide lockout in the event of a stuck or welded motor relay.

NOTICE

If flame is not established within 15 seconds of oil valve actuation (known as Trial For Ignition [TFI]) lockout will occur. Lockout is indicated by a red LED solid-on located on the oil primary control.

Latch-up will occur if the control locks-out three (3) times during a call for heat. This is indicated by red and amber LED's solid-on.

CARLIN OIL BURNER PART NUMBERS FOR CL SERIES BOILERS

NOTE: When ordering parts always give the serial and model numbers shown on the boiler and burner.

Refer to Carlin *Model EZ-1/2/3 Oil Burner-Instruction Manual* (Form #MNEZ123) for an exploded view of the burner and a list of spare parts.

For replacement Carlin oil burner parts, contact your wholesaler or the burner manufacturer:

CCT, Carlin Combustion Technology, Inc.
70 Maple Street
East Longmeadow, MA 01028
Telephone: (413) 525-7700
Facsimile: (413) 525-8306

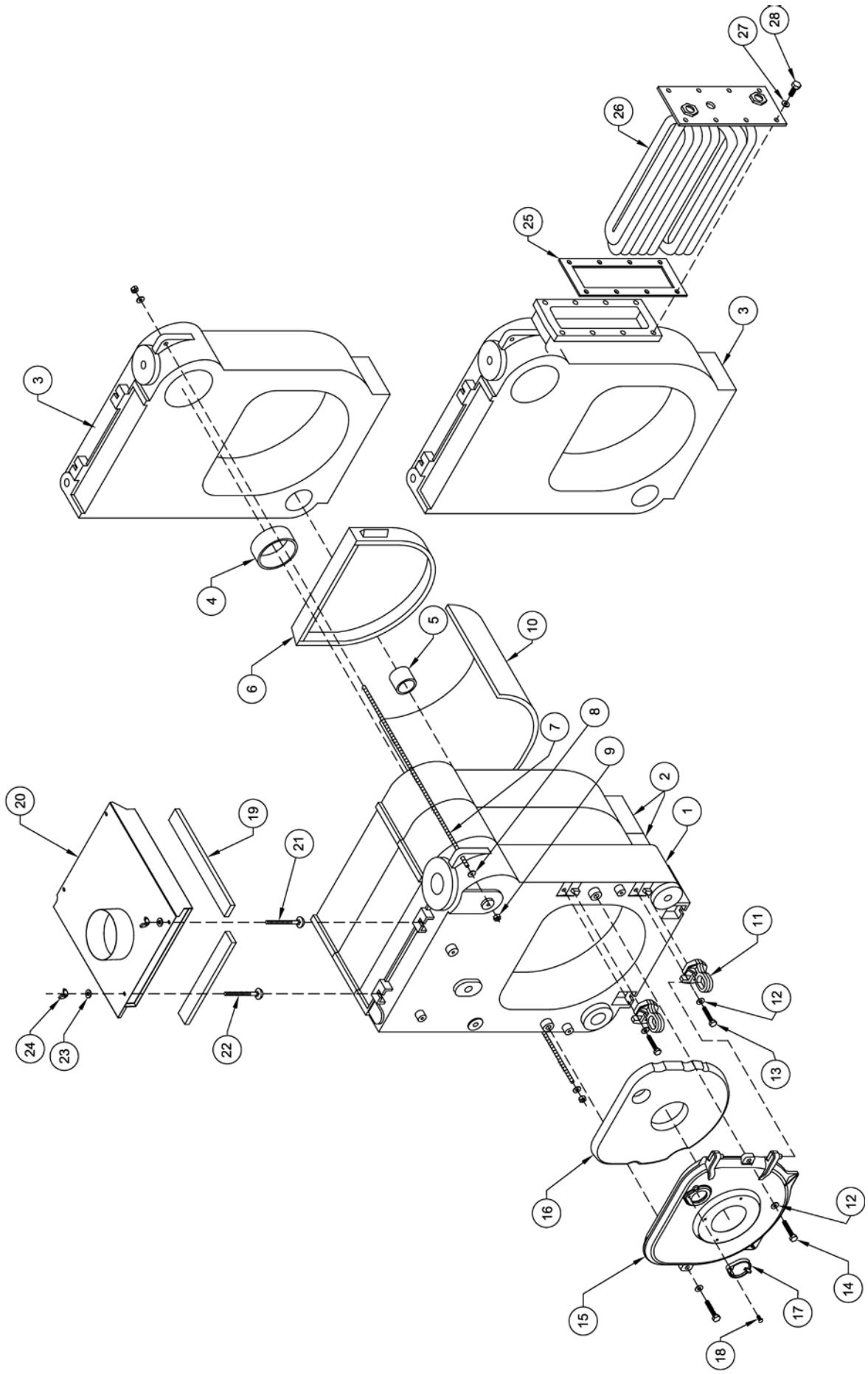
TROUBLE SHOOTING RIELLO 40 SERIES

Not Applicable to Riello 40 Series Burner, refer to *Models F3 and F5 Installation Manual, Riello 40 Series Residential Oil Burners* (C6501010 or *Model F10 Installation Manual, Riello 40 Series Residential Oil Burners* (2902554) or contact burner manufacturer.

VII. Repair Parts

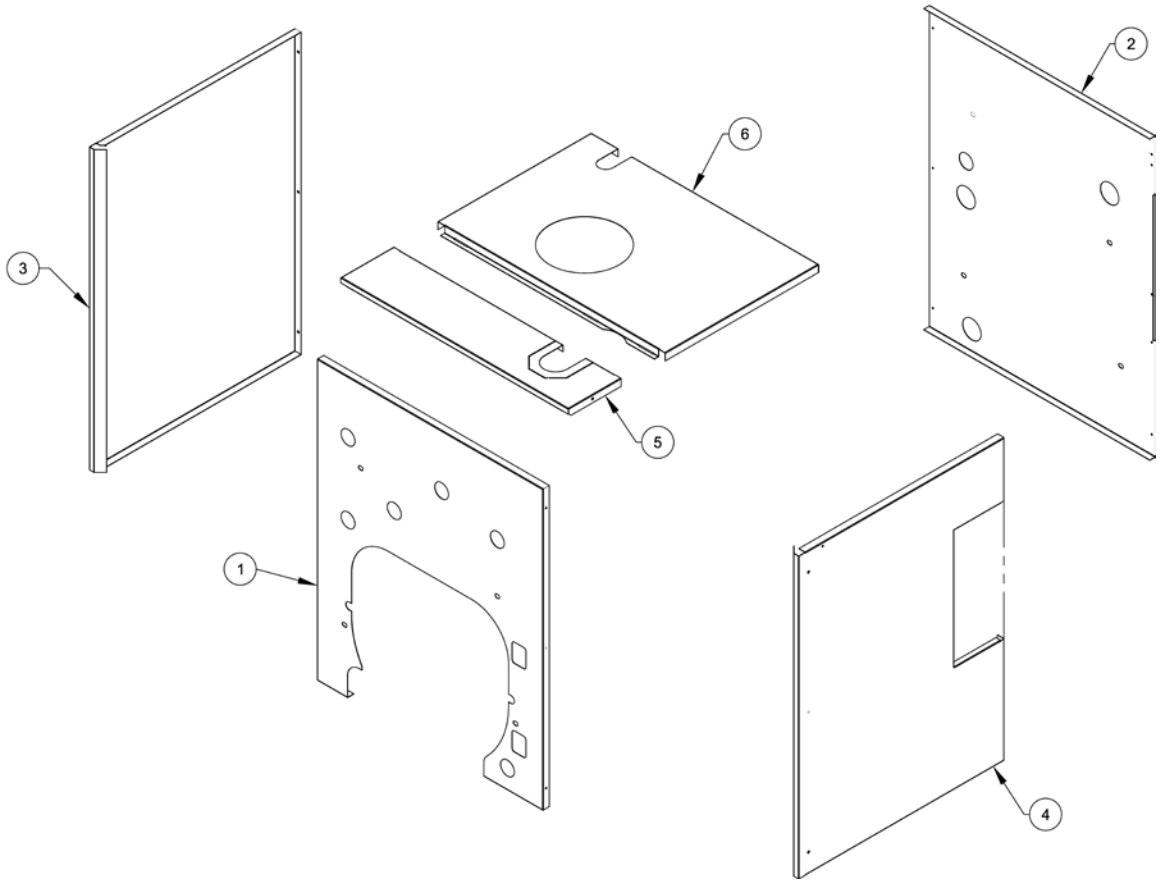
All **CL™ Series** repair parts may be ordered through New Yorker Boiler Co., Inc., or its authorized distributors.

Should you require assistance in locating a New Yorker Distributor in your area, or have questions regarding the availability of New Yorker products or repair parts, please contact: New Yorker Boiler Co., Inc., P.O. Box 10, Hatfield, PA 19440-0010, Phone: (215) 855-8055 Attn: Customer Service Department



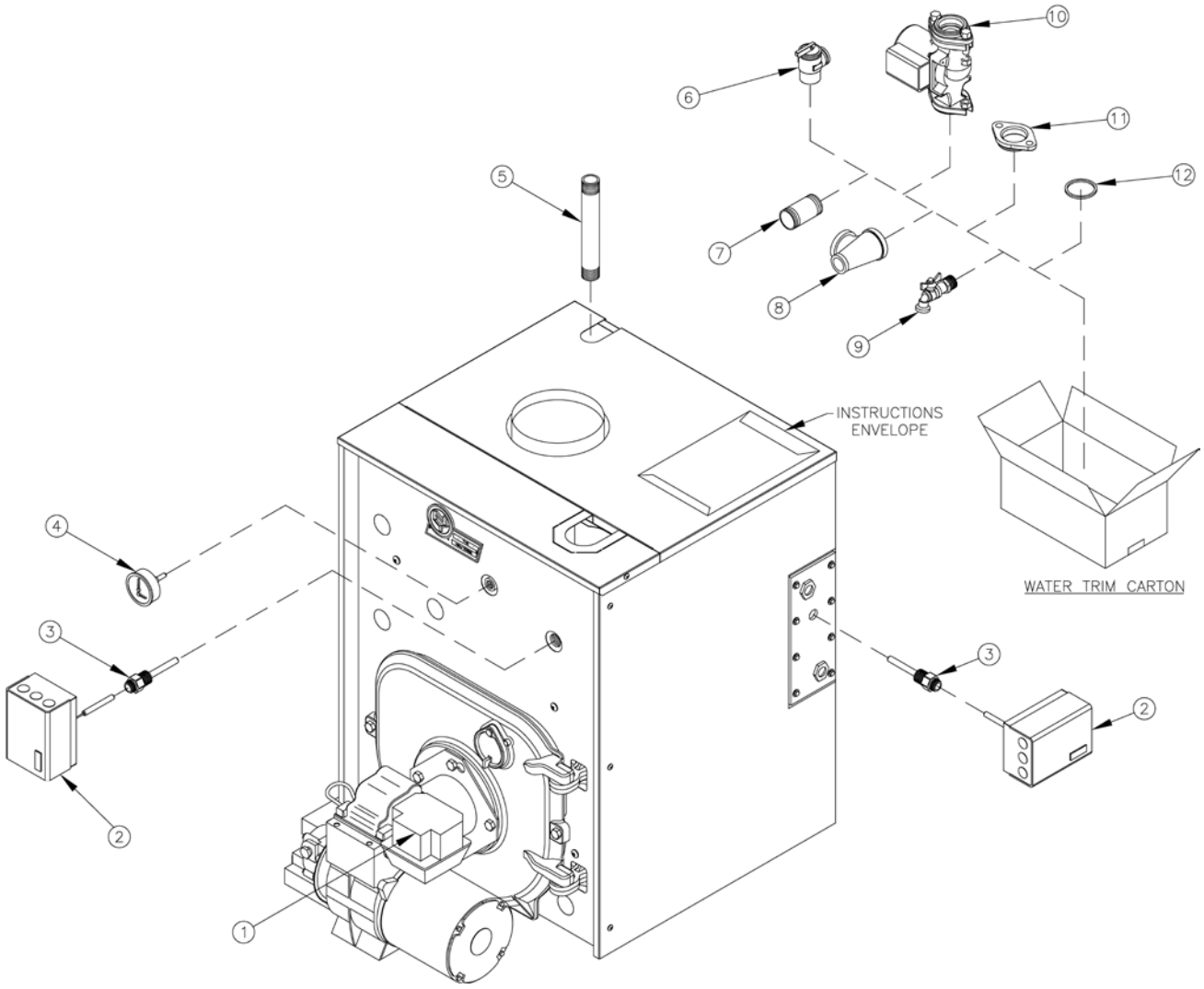
Bare Boiler Assembly (Exploded View)

Item No.	Description	Boiler Size / Quantity			Part No.
		CL3	CL4	CL5	
Bare Boiler Assembly					
1	Front Section (Non-Htr.), Machined Water ---(OR)--- Front Section (Non-Htr.), Machined Steam	1	1	1	71720103 71720104
2	Center Section	1	2	3	71720301
3	Rear Section (Non-Htr.), Machined Water ---(OR)--- Rear Section (Non-Htr.), Machined Steam	1	1	1	71720201 71720202
	Rear Heater Section, Machined Water ---(OR)--- Rear Heater Section, Machined Steam				71720203 71720204
4	5" Cast Iron Slip Nipple	2	3	4	7066003
5	Slip Nipple, 22-B Steel	2	3	4	806600375
6	Rear Target Wall Insulation	1	1	1	82020002
7	Tie Rod, 3/8"-16 x 12-1/2" Lg.	2	---	---	80861010
	Tie Rod, 3/8"-16 x 17-3/4" Lg.	---	2	---	80861032
	Tie Rod, 3/8"-16 x 23" Lg.	---	---	2	80861049
8	3/8" Flat Washer	4	4	4	80860600
9	3/8"-16 Heavy Hex Nut	4	4	4	80860423
10	Combustion Chamber Liner, 1/2" x 19-1/2" x 9-3/4"	1	---	---	82020031
	Combustion Chamber Liner, 1/2" x 19-1/2" x 14-3/4"	---	1	---	82020041
	Combustion Chamber Liner, 1/2" x 19-1/2" x 19-3/4"	---	---	1	82020051
11	BSD Hinge Loop Bracket	2	2	2	100795-02
12	5/16" Flat Washer - Plated	4	4	4	80860611
13	5/16-18 x 1" Lg. Cap Screw, Plated	2	2	2	80861341
14	5/16-18 x 1-1/2" Lg. Cap Screw, Plated	2	2	2	80861349
15	Burner Swing Door (only)	1	1	1	100793-01
16	Burner Swing Door Insulation	1	1	1	82020001
17	Observation Port Cover	1	1	1	71728004
18	5/16-18 x 3/4" Lg. Cap Screw, Plated	1	1	1	80861340
19	Canopy Sealing Strip (1/2" x 1 x 10')	1	1	1	6206001
20	Canopy Assembly - 3 Section	1	---	---	100827-03
	Canopy Assembly - 4 Section	---	1	---	100827-04
	Canopy Assembly - 5 Section	---	---	1	100827-05
21	1/4"-20 x 3" Lg. Carriage Bolt, Plated	2	2	2	80860119
22	1/4"-20 x 3-1/2" Lg. Carriage Bolt, Plated	2	2	2	100838-01
23	1/4" Flat Washer - Plated	4	4	4	80860603
24	1/4"-20 Wing Nut - Plated	4	4	4	80860910
25	Heater Cover Plate Gasket - Rear Heater	1	1	1	8036058
26	V1-2 Heater Carton (WR[T] & SR[T]) Rear Heater	1	1	1	6036031
27	5/16" Flat Washer - Plated	8	8	8	80860611
28	3/8"-16 x 7/8" Lg. Cap Screw, Plated, ASME Grade SA307B	8	8	8	80861337



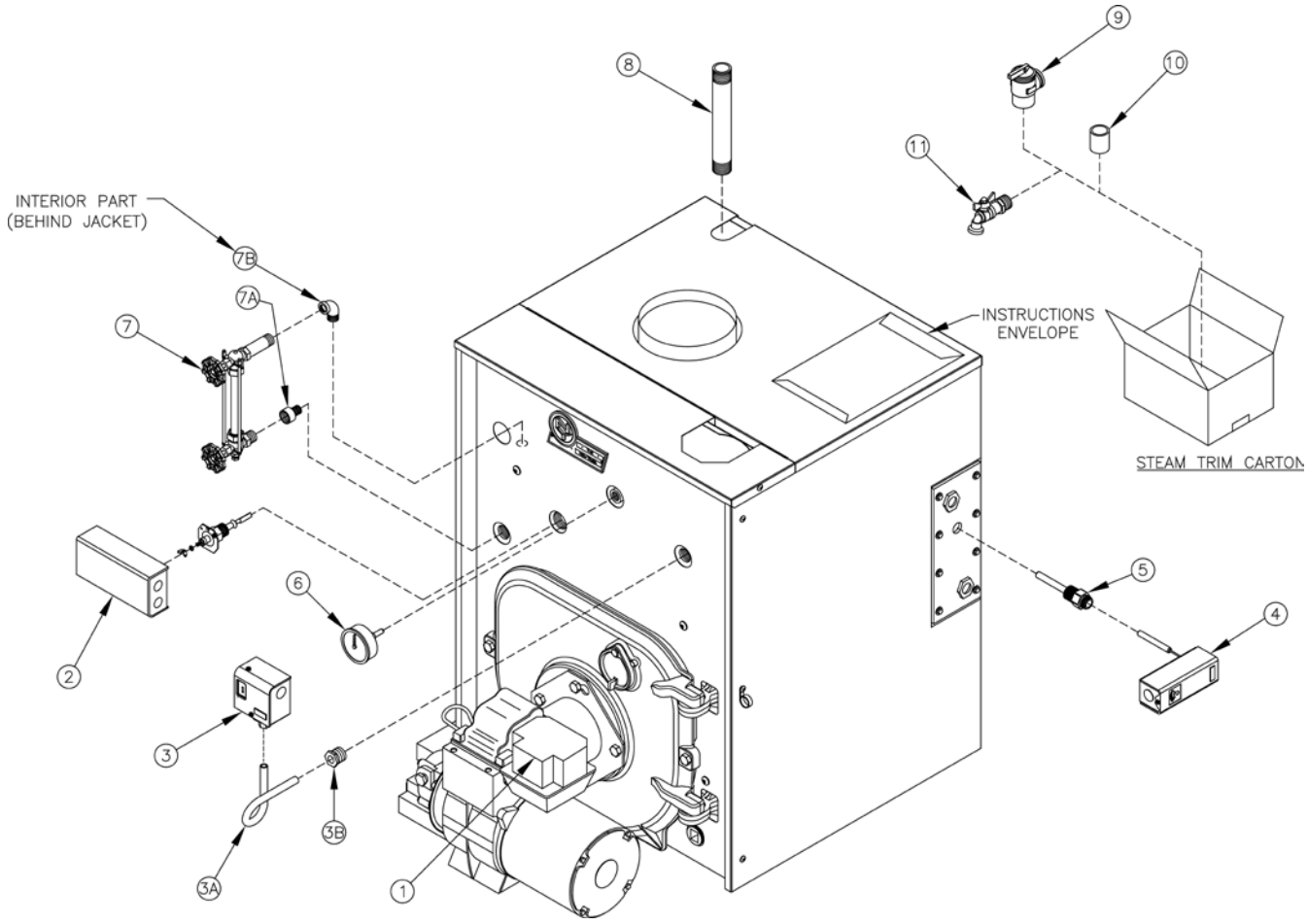
Jacket Assembly (Exploded View)

Item No.	Description		Boiler Size / Quantity			Part No.
			CL3	CL4	CL5	
Jacket Components -- Items 1 thru 6 Include Insulation as Part of Assembly						
1	Jacket Front Panel Assembly		1	1	1	100819-01
2	Jacket Rear Panel Assembly		1	1	1	100820-01
3	Jacket Reversible Side Panel Assembly	Non-Heater Build	2	---	---	100821-03
			---	2	---	100821-04
			---	---	2	100821-05
		With Heater Build	1	---	---	100821-03
			---	1	---	100821-04
			---	---	1	100821-05
4	Jacket Left Side Heater Panel Assembly (with Heater Build)		1	---	---	100824-03
			---	1	---	100824-04
			---	---	1	100824-05
5	Jacket Split Front Top Panel Assembly		1	1	1	100823-01
6	Jacket Split Rear Top Panel Assembly		1	---	---	100822-03
			---	1	---	100822-04
			---	---	1	100822-05



CL3 Thru CL5 Water Boilers - Trim and Controls

Item No.	Description	Boiler Size / Quantity			Part No.
		CL3	CL4	CL5	
CL3 Thru CL5 Water Boilers - **Trim and Controls**					
1	Beckett R7184B Oil Primary Control	1	1	1	100136-01
2	Honeywell L7248C1014 Hi Limit, Circ. Relay --- (OR)--- L7224C1004 Hi & Lo Limit, Circ. Relay	1	1	1	100059-01 100862-01
3	¾" NPT x 1½" Immersion Well, Honeywell 123870A	1	1	1	80160426
4	2½" Temperature / Pressure Gauge	1	1	1	100282-01
5	¾" NPT x 7¼" Lg. Nipple, SCH 80, Black	1	1	1	100839-01
6	Relief Valve, #10-407-05	1	1	1	81660319
7	1½" NPT x 5" Lg. Nipple, Black	1	1	1	806600060
8	1½" x ¾" x 1½" NPT Tee, Black	1	1	1	806601003
9	¾" Drain Valve	1	1	1	806603061
10	Taco 007 Circulator	1	1	1	8056007
11	1½" Circulator Flange	2	2	2	806602014
12	Taco Flange Gasket	2	2	2	806602006

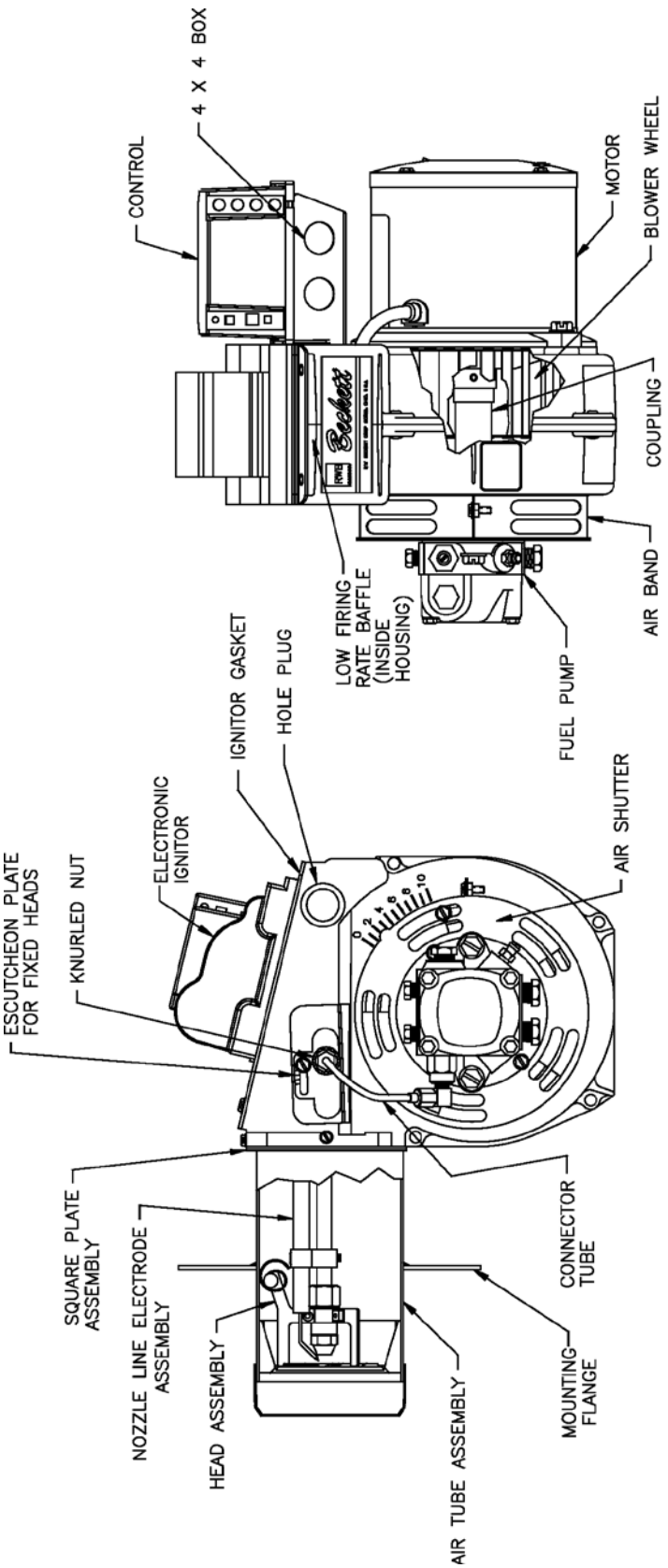


CL3 Thru CL5 Steam Boilers - Trim and Controls

Item No.	Description	Boiler Size / Quantity			Part No.
		CL3	CL4	CL5	
CL3 Thru CL5 Steam Boilers - **Trim and Controls**					
1	Beckett R7184B Oil Primary Control	1	1	1	100136-01
2	McDonnell & Miller PS801 LWCO With Probe	1	1	1	80160723
3	Honeywell PA404A1009 Pressuretrol	1	1	1	80160300
3A	¼" x 90° Syphon, 2½" Equal Leg	1	1	1	806603006
3B	¾" x ¼" NPT Bushing, Black	1	1	1	806600508
4	Honeywell L4006A2015 Aquastat	1	1	1	80160400
5	#123871A Immersion Well ¾" NPT	1	1	1	80160426
6	2½" Dia. Steam Gauge	1	1	1	100325-01
7	10¼" Gauge Glass Set, Conbraco #22-171-10	1	1	1	100854-01
7A	½" Male x ½" Female NPT Brass Extension Piece	1	1	1	100853-01
7B	½" NPT Brass Street Elbow	1	1	1	100852-01
8	¾" NPT x 7¼" Lg. Nipple, SCH 80, Black	1	1	1	100839-01
9	¾" NPT, M/F, 15 PSI Safety Valve Conbraco #13-511-08	1	1	1	81660530
10	¾" NPT Coupling	1	1	1	806602561
11	¾" NPT Drain Valve, Conbraco #35-302-03	1	1	1	806603061

BECKETT OIL BURNER PARTS LIST

MODEL AFG --- 60-Hz, 3450 RPM

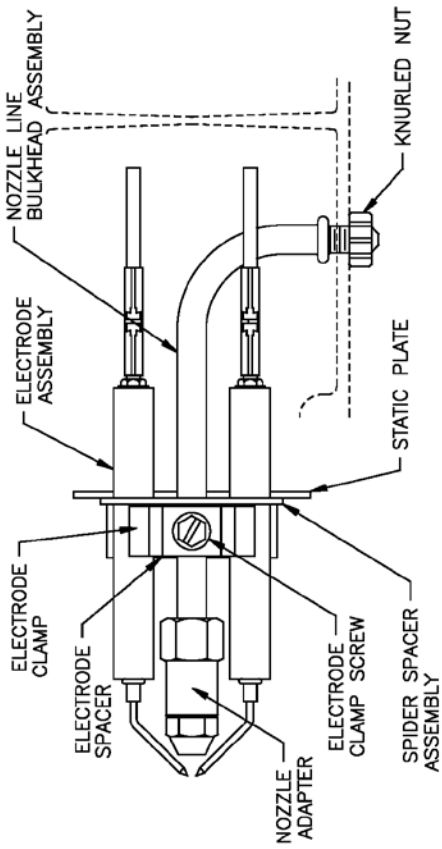


FRONT VIEW

SIDE VIEW

FOR REPLACEMENT OIL BURNER PARTS, CONTACT
YOUR WHOLESALER OR THE BURNER MANUFACTURER:

R. W. BECKETT CORP.
P.O. BOX 1289
ELYRIA, OHIO 44036
1-800-645-2876



NOZZLE DETAIL

Beckett AFG Burner

BECKETT OIL BURNER PART NOS. FOR CL SERIES BOILERS

NOTE: When ordering parts always give the serial and model numbers shown on the boiler and burner. Also provide the name of the part(s) and part number as listed below.

Boiler Model	CL3-091, 105, 140	CL4-126	CL4-175, 210	CL5-168, 245	CL5-280
Air Tube Combination	AFG70MBAS	AFG70MBAS	AFG70MDAS	AFG70MDAS	AFG70MLAS
Beckett's Spec No.	NY2701	NY2702	NY2703	NY2704	NY2705
Air Band	3492A	3492A	3492A	3492A	3492A
Air Band Nut	4150	4150	4150	4150	4150
Air Band Screw	4198	4198	4198	4198	4198
Air Shutter	3709	3709	3709	3709	3709
Air Shutter Screw	4198	4198	4198	4198	4198
Blower Wheel	2999	2999	2999	2999	2999
Coupling	2454	2454	2454	2454	2454
Low Firing Rate Baffle	5880[1]	----	----	----	----
Bulkhead Knurled Locknut	3-666	3-666	3-666	3-666	3-666
Connector Tube Assembly	5636	5636	5636	5636	5636
Electrode Clamp	1-49	1-49	1-49	1-49	1-49
Electrode Clamp Screw	4219	4219	4219	4219	4219
Electrode Insulator Assembly	5780	5780	5780	5780	5780
Spider Spacer Assembly	5653	5653	5653	5653	5653
Escutcheon Plate	3493	3493	----	----	----
Adjusting Plate Assembly	----	----	5941	5941	5941
Head	5912	5912	5913	5913	5913
Head Screws	4221	4221	4221	4221	4221
Flange Gasket	3416	3416	3416	3416	3416
AFG Housing	5874BK	5874BK	5874BK	5874BK	5874BK
Motor	21805	21805	21805	21805	21805
Nozzle Adapter	2-13	2-13	2-13	2-13	2-13
Nozzle Line Electrode Assembly	NL70MB	NL70MB	NL70MD	NL70MD	NL70ML
Oil Pump, Clean Cut (Single Stage)	2184404U	2184404U	2184404U	2184404U	2184404U
Oil Pump, Clean Cut (Two Stage)	21941U	21941U	21941U	21941U	21941U
Static Plate	3384	3384	3384	3384	Less
Ignitor	51771U	51771U	51771U	51771U	51771U
Ignitor Hinge Screw	4217	4217	4217	4217	4217
Ignitor Holding Screw	4292	4292	4292	4292	4292
Ignitor Gasket Kit	51304	51304	51304	51304	51304
Junction Box	5770	5770	5770	5770	5770
Flame Detector	7006	7006	7006	7006	7006
Oil Solenoid Valve Coil	21755	21755	21755	21755	21755
Oil Solenoid Valve Cord	21807	21807	21807	21807	21807

[1] 5880 used on CL3-091 firing rate only

VIII. Low Water Cut Off (LWCO)

WARNING

DO NOT ATTEMPT to cut factory wires to install an aftermarket Low Water Cut Off (LWCO). Only use connections specifically identified for Low Water Cut Off.

In all cases, follow the Low Water Cut Off (LWCO) manufacturer's instructions.

When

A low water cutoff is required to protect a hot water boiler when any connected heat distributor (radiation) is installed below the top of the hot water boiler (i.e. baseboard on the same floor level as the boiler). In addition, some jurisdictions require the use of a LWCO with a hot water boiler.

Where

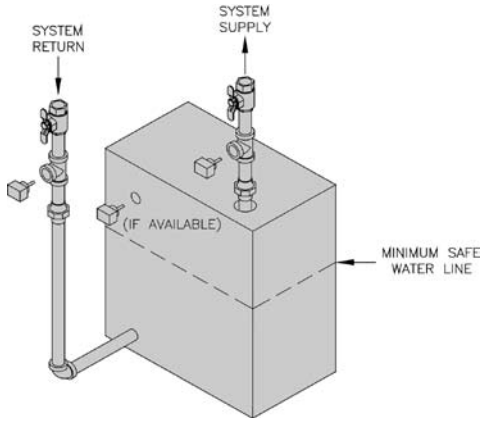
The universal location for a LWCO on both gas and oil hot water boilers is above the boiler, in either the supply or return piping. The minimum safe water level of a water boiler is at the uppermost top of the boiler; that is, it must be full of water to operate safely.

What Kind

Typically, in residential applications, a probe type LWCO is used instead of a float type, due to their relative costs and the simplicity of piping for a probe LWCO.

How to Pipe

A "tee" is commonly used to connect the probe LWCO to the supply or return piping, as shown below.



LWCO Location

Select the appropriate size tee using the LWCO manufacturer's instructions. Often, the branch connection must have a **minimum** diameter to prevent bridging between the probe and the tee. Also, the run of the tee must have a minimum diameter to prevent the end of the probe from touching or being located too close to the inside wall of the run of the tee.

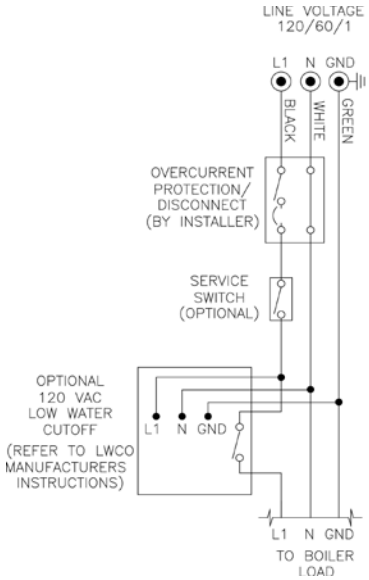
Ideally, manual shutoff valves should be located above the LWCO and the boiler to allow for servicing. This will allow probe removal for inspection without draining the heating system. Many probe LWCO manufacturers recommend an annual inspection of the probe.

How to Wire

LWCO's are available in either 120 VAC or 24 VAC configurations. The 120 VAC configuration can be universally applied to both gas and oil boilers by wiring it in the line voltage service to the boiler (after the service switch, if so equipped).

The presence of water in a properly installed LWCO will cause the normally open contact of the LWCO to close, thus providing continuity of the 120 VAC service to the boiler.

It is recommended to supply power to the probe LWCO with the same line voltage boiler service as shown below.



Wiring of Typical LWCO

A 24 VAC LWCO is used primarily for gas fired boilers where a 24 volt control circuit exists within the boiler. However, a 24 VAC LWCO can only be used if the boiler manufacturer has provided piping and wiring connections and instructions to allow for this application.

How to Test

Shut off fuel supply. Lower water level until water level is BELOW the LWCO. Generate a boiler demand by turning up thermostat. Boiler should not attempt to operate. Increase the water level by filling the system. The boiler should attempt to operate once the water level is above the LWCO.

TABLE 9: BURNER SPECIFICATIONS

Beckett AFG							
Boiler Model	Firing Rate GPH	Settings			Nozzle		[3] Pump Pressure
		Head (Setting)	Air Shutter	Air Band	GPH x Angle Type	[2] Shipped	
[1] CL3-091	0.65	L1	8	0	0.55 x 70B (Delavan)	▲ Loose	140
CL3-105	0.75	L1	6	0	0.65 x 45B (Hago)	▲ Loose	140
▲ CL3-140	1.00	L1	10	1	0.85 x 45B (Hago)	Installed	140
CL4-126	0.90	L1	7	0	0.75 x 45B (Delavan)	Installed	140
CL4-175	1.25	V1(0)	10	1	1.00 x 45B (Hago)	∗ Loose	175
∗ CL4-210	1.50	V1(0)	10	2	1.10 x 45B (Hago)	Installed	175
CL5-168	1.20	V1(2)	10	0	0.90 x 45B (Hago)	● Loose	175
● CL5-245	1.75	V1(3)	7	3	1.35 x 45B (Hago)	Installed	175
CL5-280	2.00	V1(4)	10	3	1.50 x 45B (Hago)	Installed	175

Carlin Burner							
Boiler Model	Firing Rate GPH	Burner Model	Settings		Nozzle		[3] Pump Pressure
			Head Bar	Air Band	GPH x Angle Type	[2] Shipped	
CL3-091	0.65	EZ-1HP	0.50	0.55	0.55 x 70B (Delavan)	▲ Loose	150
CL3-105	0.75		0.60/0.65	0.60	0.60 x 60ES (Hago)	▲ Loose	150
▲ CL3-140	1.00		0.85/1.00	0.75	0.85 x 60B (Hago)	Installed	150
CL4-126	0.90		0.75	0.75	0.75 x 60A (Delavan)	∗ Loose	150
CL4-175	1.25		0.85/1.00	1.00-1.10	1.00 x 60A (Delavan)	∗ Loose	150
∗ CL4-210	1.50		1.10/1.25	1.25-1.35	1.25 x 60B (Hago)	Installed	150
CL5-168	1.20		0.85/1.00	0.90	1.00 x 60B (Hago)	Installed	150
CL5-245	1.75	EZ-2HP	1.50	1.75	1.50 x 60A (Delavan)	Installed	150

[1] Beckett low firing rate baffle required on CL3-091 (0.65 GPH) application only; shipped loose with nozzle.

[2] Nozzle(s) for alternate boiler model firing rate(s) are shipped loose in bag attached to the burner designated by corresponding symbol, i.e. (▲) = CL3-140.

[3] Single stage fuel pump is standard, two stage fuel pump is optional. Burner manufacturer has preset single stage fuel pump to settings shown in table above.

RIELLO OIL BURNER PART NUMBERS FOR CL SERIES BOILERS

NOTE: When ordering parts always give the serial and model numbers shown on the boiler and burner.

Refer to *Models F3 & F5 Installation Manual, Riello 40 Series Residential Oil Burners* (C6501010) or *Model F10 Installation Manual, Riello 40 Series Residential Oil Burners* (2902554) for an exploded view of the burner and a list of spare parts.

For replacement Riello oil burner parts, contact your wholesaler or the burner manufacturer:

Riello Corporation of America
35 Pond Park Road
Hingham, Massachusetts 02043
Telephone: (617) 749-8292
Facsimile: (617) 740-2069
Toll Free: (outside Massachusetts)
(800) 992-7637

Riello Canada Inc.
2165 Meadowpine Blvd.
Mississauga, Ontario L5N 6H6
Telephone: (905) 542-0303
Facsimile: (905) 542-1525
Toll Free: (800) 387-3898

TABLE 9A: RIELLO BURNER SPECIFICATIONS

Boiler Model	Firing Rate GPM	Burner Model	Settings		Nozzle		Pump Pressure	Combustion Head	Insertion Depth
			Air Shutter	Turbulator	GPH x Angle Type	Shipped			
CL3-105	0.75	40F5	2.60	0	0.60 x 60A (Delavan)	Loose	150	SBT 6.0”	2-3/8”
CL3-140	1.00		2.85	2	0.85 x 60W (Delavan)	Installed			
CL4-175	1.25	40F5	4	4	1.00 x 60A (Delavan)	Installed		SBT 6.0”	2-3/8”
CL4-210	1.50	40F10	3	1	1.25 x 60B (Delavan)	Installed		SBT 5.0”	2-1/2”
CL5-245	1.75	40F10	3	1.5	1.35 x 45B (Delavan)	Loose		SBT 5.0”	2-1/2”
CL5-280	2.00		3.8	2	1.65 x 45B (Delavan)	Installed			

SERVICE RECORD

DATE SERVICE PERFORMED

SERVICE RECORD

DATE SERVICE PERFORMED

SERVICE RECORD

DATE SERVICE PERFORMED

NEW YORKER BOILER CO., INC.

Limited Warranties

For Residential Cast Iron and Steel Water Boilers

By this Warranty Statement New Yorker Boiler Co., Inc. ("New Yorker"), issues limited warranties subject to the terms and conditions stated below. These limited warranties apply to residential cast iron and steel water boilers labeled with the New Yorker® brand which are sold on or after March 1, 2004.

ONE YEAR LIMITED WARRANTY

One Year Limited Warranty for Residential Water Boilers New Yorker warrants to the original consumer purchaser at the original installation address that its residential cast iron and steel water boilers will be free from defects in material and workmanship under normal usage for a period of one year from the date of original installation. In the event that any defect in material or workmanship is found during the one year period following the date of installation, New Yorker will, at its option, repair the defective part or provide a replacement free of charge, F.O.B. its factory.

FIVE YEAR LIMITED WARRANTY

Five Year Pressure Vessel Limited Warranty for WC™ Residential Water Boilers New Yorker warrants to the original consumer purchaser at the original installation address that the pressure vessel of the boiler will be free of defects in material and workmanship under normal usage for a period of five years following the date of installation. In the event that any defect in material or workmanship is found during the five year period following the date of installation, New Yorker will, at its option, repair the defective pressure vessel or provide a replacement free of charge, F.O.B. its factory.

LIFETIME LIMITED WARRANTY

Lifetime Pressure Vessel Limited Warranty for AP-U™, FR™, S-AP™, microTEK3™, microTEKDV™, CLW™, CG-A™, and PVCG™ Residential Water Boilers New Yorker warrants to the original consumer purchaser at the original installation address that the pressure vessel component of the boiler will be free of defects in material and workmanship under normal usage for the lifetime of the original consumer purchaser. In the event that any defect in material or workmanship is found during the ten year period following the date of installation, New Yorker will, at its option, repair the defective pressure vessel or provide a replacement free of charge, F.O.B. its factory. In the event that any defect in material or workmanship is found after the tenth year following the date of installation, New Yorker will provide a replacement pressure vessel upon payment by the original consumer purchaser of an amount equal to a percentage of the then current retail price of the model boiler involved (or, in the event that such model is not then in production, the most comparable model then in production), as follows:

Years In Service	11th	12th	13th	14th	15th	16th	17th	18th
Consumer Purchaser Pays	5%	10%	15%	20%	25%	30%	35%	40%

Years In Service	19th	20th	21st	22nd	23rd	24th	25th and beyond
Consumer Purchaser Pays	45%	50%	55%	60%	65%	70%	75%

EXCEPTIONS AND EXCLUSIONS

1. Components Manufactured by Others Following the expiration of the foregoing one year limited warranty, all component parts of a boiler which are manufactured by others (such as burners, burner controls, circulator, tankless water heater, and New Yorker Link) shall be subject only to the manufacturer's warranty, if any.

2. Removal and Replacement Costs These warranties do not cover expenses of removal or reinstallation. The consumer purchaser will be responsible for the cost of removing and replacing any defective part and all labor and related materials connected therewith. Replacement parts will be invoiced to the distributor in the usual manner and will be subject to adjustment upon proof of defect.

3. Proper Installation These warranties are conditioned upon the installation of the boiler in strict compliance with New Yorker's Installation, Operating and Service Instructions. New Yorker specifically disclaims any liability of any kind which arises from or relates to improper installation.

4. Improper Use or Maintenance These warranties will not be applicable if the boiler is used or operated over its rated capacity, is installed for uses other than home heating, or is not maintained in accordance with New Yorker's Installation, Operating and Service Instructions and hydronics industry standards.

5. Improper Operation These warranties will not be applicable if the boiler has been damaged as a result of being improperly serviced or operated, including but not limited to the following: operated with insufficient water; allowed to freeze; subjected to flood conditions; or operated with water conditions and/or fuels or additives which cause unusual deposits or corrosion in or on the pressure vessel or associated controls.

6. Geographic Limitations These warranties apply only to boilers installed within the 48 contiguous United States.

7. Installation Requirements In order for these warranties to be effective:

a. The boiler must be installed in a single or two-family residential dwelling. This warranty does not apply to boilers installed in apartments or for commercial or industrial applications.

b. The boiler must be installed in strict compliance with New Yorker's Installation, Operating and Service Instructions by an installer regularly engaged in boiler installations.

c. Boiler sections must not have been damaged during shipment or installation.

d. The boiler must be vented in accordance with chimney recommendations set forth in New Yorker's Installation, Operating and Service Instructions.

8. Exclusive Remedy New Yorker's obligation in the event of any breach of these warranties is expressly limited to the repair or replacement of any part found to be defective under conditions of normal use.

9. Limitation of Damages Under no circumstances will New Yorker be liable for incidental, indirect, special or consequential damages of any kind under these warranties, including, without limitation, injury or damage to persons or property and damages for loss of use, inconvenience or loss of time. New Yorker's liability under these warranties shall under no circumstances exceed the purchase price paid for the boiler involved. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

10. Limitation of Warranty These limited warranties are given in lieu of all other express warranties and set forth the entire obligation of New Yorker with respect to any defect in a residential water boiler. New Yorker shall have no express obligations, responsibilities or liabilities of any kind, other than those set forth herein.

ALL APPLICABLE IMPLIED WARRANTIES, IF ANY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY LIMITED IN DURATION TO A PERIOD OF ONE YEAR, EXCEPT THAT IMPLIED WARRANTIES, IF ANY, APPLICABLE TO THE PRESSURE VESSEL OF A RESIDENTIAL WATER BOILER SHALL BE LIMITED IN DURATION TO THE LESSER OF THE DURATION OF SUCH IMPLIED WARRANTY OR A PERIOD EQUAL TO THE TERM OF THE APPLICABLE EXPRESS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

PROCEDURE FOR OBTAINING WARRANTY SERVICE

Upon discovery of a condition believed to be related to a defect in material or workmanship covered by these warranties, the original consumer purchaser should notify the installer, who will in turn notify the distributor. If this action is not possible or does not produce a prompt response, the original consumer purchaser should write to New Yorker Boiler Co., Inc. at P.O. Box 10, Hatfield, PA 19440-0010, giving full particulars in support of the claim.

The original consumer purchaser is required to make available for inspection by New Yorker or its representative the parts claimed to be defective and, if requested by New Yorker, to ship those parts prepaid to New Yorker at the above address for inspection or repair. In addition, the original consumer purchaser agrees to make all reasonable efforts to settle any disagreement arising in connection with any warranty claim before resorting to legal remedies in the courts.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

New Yorker®
RESIDENTIAL HEATING BOILERS

02/04

NEW YORKER BOILER CO., INC.

Limited Warranties

For Residential Cast Iron Steam Boilers

By this Warranty Statement New Yorker Boiler Co., Inc. ("New Yorker") issues limited warranties subject to the terms and conditions stated below. These limited warranties apply to residential cast iron steam boilers labeled with the New Yorker® brand which are sold on or after March 1, 2004

ONE YEAR LIMITED WARRANTY

One Year Limited Warranty for Residential Cast Iron Steam Boilers New Yorker warrants to the original consumer purchaser at the original installation address that its residential cast iron steam boilers will be free of defects in material and workmanship under normal usage for a period of one year from the date of original installation. In the event that any defect in material or workmanship is found during the one-year period following the date of installation, New Yorker will, at its option, repair the defective part or provide a replacement free of charge, F.O.B. its factory.

TEN YEAR LIMITED WARRANTY

Ten Year Pressure Vessel Limited Warranty for Residential Cast Iron Steam Boilers New Yorker warrants to the original consumer purchaser at the original installation address that the pressure vessel of its residential cast iron steam boilers will be free of defects in material and workmanship under normal usage for a period of 10 years from the date of original installation. In the event that any defect in material or workmanship is found during the ten year period following the date of installation, New Yorker will, at its option, repair the defective pressure vessel or provide a replacement free of charge, F.O.B. its factory.

EXCEPTIONS AND EXCLUSIONS

1. Components Manufactured by Others Following the expiration of the foregoing one year limited warranty, all component parts of a boiler which are manufactured by others (such as burners, burner controls, circulator, tankless water heater, and New Yorker Link) shall be subject only to the manufacturer's warranty, if any.

2. Removal and Replacement Costs These warranties do not cover expenses of removal or reinstallation. The consumer purchaser will be responsible for the cost of removing and replacing any defective part and all labor and related materials connected therewith. Replacement parts will be invoiced to the distributor in the usual manner and will be subject to adjustment upon proof of defect.

3. Proper Installation These warranties are conditioned upon the installation of the boiler in strict compliance with New Yorker's Installation, Operating and Service Instructions. New Yorker specifically disclaims any liability of any kind which arises from or relates to improper installation.

4. Improper Use or Maintenance These warranties will not be applicable if the boiler is used or operated over its rated capacity, is installed for uses other than home heating, or is not maintained in accordance with New Yorker's Installation, Operating and Service Instructions and hydronics industry standards.

5. Improper Operation These warranties will not be applicable if the boiler has been damaged as a result of being improperly serviced or operated, including but not limited to the following: operated with insufficient water; allowed to freeze; subjected to flood conditions; or operated with water conditions and/or fuels or additives which cause unusual deposits or corrosion in or on the pressure vessel or associated controls.

6. Geographic Limitations These warranties apply only to boilers installed within the 48 contiguous United States.

7. Installation Requirements In order for these warranties to be effective:

a) The boiler must be installed in a single or two-family residential dwelling. This warranty does not apply to boilers installed in apartments or for commercial or industrial applications.

b) The boiler must be installed in strict compliance with New Yorker's Installation, Operating and Service Instructions, including the installation of a low water cut-off, by an installer regularly engaged in boiler installations.

c) Boiler sections must not have been damaged during shipment or installation.

d) The boiler must be vented in accordance with chimney recommendations set forth in New Yorker's Installation, Operating and Service Instructions.

8. Exclusive Remedy New Yorker's obligation in the event of any breach of these warranties is expressly limited to the repair or replacement of any part found to be defective under conditions of normal use.

9. Limitation of Damages Under no circumstances will New Yorker be liable for incidental, indirect, special or consequential damages of any kind under these warranties, including, without limitation, injury or damage to persons or property and damages for loss of use, inconvenience or loss of time. New Yorker's liability under these warranties shall under no circumstances exceed the purchase price paid for the boiler involved. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

10. Limitation of Warranty These limited warranties are given in lieu of all other express warranties and set forth the entire obligation of New Yorker with respect to any defect in a residential cast iron steam boiler. New Yorker shall have no express obligations, responsibilities or liabilities of any kind, other than those set forth herein.

ALL APPLICABLE IMPLIED WARRANTIES, IF ANY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY LIMITED IN DURATION TO A PERIOD OF ONE YEAR, EXCEPT THAT IMPLIED WARRANTIES, IF ANY, APPLICABLE TO THE PRESSER VESSEL OF A RESIDENTIAL CAST IRON STEAM BOILER SHALL BE LIMITED IN DURATION TO THE LESSER OF THE DURATION OF SUCH IMPLIED WARRANTY OR A PERIOD OF TEN YEARS. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

PROCEDURE FOR OBTAINING WARRANTY SERVICE

Upon discovery of a condition believed to be related to a defect in material or workmanship covered by these warranties, the original consumer purchaser should notify the installer, who will in turn notify the distributor. If this action is not possible or does not produce a prompt response, the original consumer purchaser should write to New Yorker Boiler Co., Inc. at P.O. Box 10, Hatfield, PA 19440-0010, giving full particulars in support of the claim.

The original consumer purchaser is required to make available for inspection by New Yorker or its representative the parts claimed to be defective and, if requested by New Yorker, to ship those parts prepaid to New Yorker at the above address for inspection or repair. In addition, the original consumer purchaser agrees to make all reasonable efforts to settle any disagreement arising in connection with any warranty claim before resorting to legal remedies in the courts.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

New Yorker®
RESIDENTIAL HEATING BOILERS

02/04